REVIEW OF THE SITE SELECTION PROCESS FOR THE SUPERCONDUCTING SUPER COLLIDER

HEARING

BEFORE THE

COMMITTEE ON SCIENCE, SPACE, AND TECHNOLOGY U.S. HOUSE OF REPRESENTATIVES

ONE HUNDRED FIRST CONGRESS

FIRST SESSION

APRIL 5, 1989

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REVIEW OF THE SITE SELECTION PROCESS FOR THE SUPERCONDUCTING SUPER COLLIDER

WEDNESDAY, APRIL 5, 1989

HOUSE OF REPRESENTATIVES,
COMMITTEE ON SCIENCE, SPACE, AND TECHNOLOGY,
Washington, DC.

The full committee met at 10:15 a.m., in room 2318, Rayburn House Office Building, Hon. Robert A. Roe, chairman, presiding.

Chairman ROE. The committee will come to order. Before I make my opening statement, I would ask unanimous consent, without objection, that there be permission that this meeting be covered by television, radio, and still photography. Without objection, so ordered.

Good morning, ladies and gentlemen. The committee will come to order.

Two years ago, the Department of Energy invited states to propose a location for the Superconducting Super Collider. Thirty-five states met the qualifying criteria established by the Department. Of course, as we know, a lively competition to reduce this list then ensued.

Our meeting this morning will evaluate the process by which the super collider site was finally chosen. From the outset of the process, the committee has made clear its determination to see that all participants receive fair and equal treatment in competing for the super collider.

The Chair stresses that we intend to examine the process used by the Department of Energy in making its decision. The choice of a particular site is not in question today; nor is the question whether or not to build a super collider. The question before us is: Was the process fair? That alone is the question to be answered today.

I am pleased to welcome our witnesses this morning. Dr. Kasper and Mr. Hunter are no strangers to the committee. Both have been closely involved with the site selection process in their respective services, the National Academies and the Department of Energy.

Ms. Flora Milans is here to represent the General Accounting Office. As you know, this committee, in March 1988, requested an independent audit from GAO of the method used by the National Academy of Sciences and the National Academy of Engineering to advise the Energy Department on which sites were best qualified to host the super collider. Ms. Milans will also discuss this audit, as well as the second audit requested by the distinguished Senator from Arizona, Senator DeConcini.

This audit was to evaluate the Department of Energy's selection of the preferred site for the super collider, to ensure that technical criteria continued to govern the decision-making process.

The committee is alsc fortunate to hear from Dr. Brad Vinson from Texas A&M. Dr. Vinson is a specialist in what one magazine dubbed, and I quote, "insects from hell," better known as the fire ant. We have all come to know more about this fierce species as a result of the site selection process. Dr. Vinson is here to tell us about the efforts to control this pest at the super collider site.

[The complete statement of the Honorable Robert A. Roe follows:]

OPENING STATEMENT
BY THE

HON. ROBERT A. ROE

CHAIRMAN, COMMITTEE ON SCIENCE, SPACE,
AND TECHNOLOGY

HEARING ON THE SELECTION PROCESS FOR THE
SUPERCONDUCTING SUPER COLLIDER
APRIL 5, 1989

GOOD MORNING, LADIES AND GENTLEMEN. THE COMMITTEE WILL COME TO ORDER.

TWO YEARS AGO, THE DEPARTMENT OF ENERGY INVITED STATES TO PROPOSE LOCATIONS FOR THE SUPERCONDUCTING SUPER COLLIDER. THIRTY-FIVE SITES MET THE QUALIFYING CRITERIA ESTABLISHED BY THE DEPARTMENT. A LIVELY COMPETITION TO REDUCE THIS LIST THEN ENSUED.

WE ARE MEETING THIS MORNING TO EVALUATE THE PROCESS BY WHICH THE SUPER COLLIDER SITE WAS FINALLY CHOSEN. FROM THE OUTSET OF THE PROCESS, THE COMMITTEE HAS MADE CLEAR ITS DETERMINATION TO SEE THAT ALL PARTICIPANTS RECEIVED FAIR AND EQUAL TREATMENT IN COMPETING FOR THE SUPER COLLIDER.

THE CHAIR STRESSES THAT WE INTEND TO EXAMINE THE PROCESS USED BY THE DEPARTMENT OF ENERGY IN MAKING ITS DECISION. THE CHOICE OF A PARTICULAR SITE IS NOT IN QUESTION TODAY, NOR IS THE QUESTION OF WHETHER OR NOT TO BUILD THE SUPER COLLIDER. WAS THE PROCESS FAIR? THAT ALONE IS THE QUESTION TO BE ANSWERED.

I AM PLEASED TO WELCOME OUR WITNESSES THIS MORNING. DR. KASPER AND MR. HUNTER ARE NO STRANGERS TO THE COMMITTEE. BOTH HAVE BEEN CLOSELY INVOLVED WITH THE SITE SELECTION PROCESS IN THEIR RESPECTIVE SERVICE AT THE NATIONAL ACADEMIES AND THE DEPARTMENT OF ENERGY.

MS. FLORA MILANS IS HERE TO REPRESENT THE GENERAL ACCOUNTING OFFICE. THIS COMMITTEE, IN MARCH 1988, REQUESTED AN INDEPENDENT AUDIT FROM G-A-O OF THE METHOD USED BY THE NATIONAL ACADEMY OF SCIENCES AND THE NATIONAL ACADEMY OF ENGINEERING TO ADVISE THE ENERGY DEPARTMENT WHICH SITES WERE BEST QUALIFIED TO HOST THE SUPER COLLIDER. MS. MILANS WILL ALSO DISCUSS THIS AUDIT, AS WELL AS A SECOND AUDIT REQUESTED BY THE DISTINGUISHED SENATOR FROM ARIZONA, MR. DECONCINI. THAT AUDIT WAS TO EVALUATE THE DEPARTMENT OF ENERGY'S SELECTION OF THE PREFERRED SITE FOR THE SUPER COLLIDER TO ASSURE THAT TECHNICAL CRITERIA CONTINUED TO GOVERN THE DECISION-MAKING PROCESS.

THE COMMITTEE IS ALSO FORTUNATE TO HEAR FROM DR. BRAD VINSON FROM TEXAS A&M. DR. VINSON IS A SPECIALIST IN WHAT ONE MAGAZINE DUBBED "THE INSECT FROM HELL," BETTER KNOWN TO ALL OF US AS THE FIRE ANT. WE HAVE ALL COME TO LEARN MORE ABOUT THIS FIERCE SPECIES AS A RESULT OF THE SITE SELECTION PROCESS. DR. VINSON HAS BEEN INVITED TO DESCRIBE FOR US THE EFFORTS UNDERWAY TO CONTROL THIS PEST AT THE SUPER COLLIDER SITE.

AT THIS TIME, I RECOGNIZE THE GENTLEMAN FROM PENNSYLVANIA, THE COMMITTEE'S RANKING REPUBLICAN MEMBER, MR. WALKER.

[The complete statement of the Honorable Robert S. Walker follows:]

HONORABLE ROBERT S. WALKER (R-PA)
OPENING STATEMENT ON SSC
APRIL 5, 1989

MR. CHAIRMAN, I COMMEND YOUR CALLING THIS HEARING THIS MORNING. THE SUPERCONDUCTING SUPER COLLIDER IS BROUGHT TO US AS THE HIGH ENERGY PHYSICS COMMUNITY'S HIGHEST PRIORITY. AND ALTHOUGH MANY YEARS DOWN THE ROAD, GREAT THINGS ARE PROMISED OF THE SSC, EVEN IF THEIR SPECIFICITY AND MAGNITUDE ARE UNKNOWN AND CANNOT BE FULLY EXPLAINED. DON'T GET ME WRONG, I UNDERSTAND AND APPRECIATE THE HISTORY OF UNEXPECTED SCIENTIFIC BREAKTHROUGHS AND THE ADVANCES THEY HAVE BROUGHT OUR WORLD, FROM NUCLEAR ENERGY TO TRANSISTORS. UNFORTUNATELY, THE OTHER REALITY WE ARE ALWAYS FORCED TO UNDERSTAND AND APPRECIATE IS THAT WE ALSO LIVE IN A WORLD OF CONSTRAINTS, IN THIS CASE FISCAL CONSTRAINTS.

BACK DOWN TO EARTH, THIS COMMITTEE HAS THE VERY DIFFICULT BUT REAL TASK OF REVIEWING AND DECIDING AMONG MANY EXTREMELY MENRITORIOUS PROGRAMS AND PROJECTS. WE MUST MAKE THOSE DECISIONS BASED ON WHAT WE DO KNOW AND WHAT WE, IN FACT, CAN EVALUATE AND PRIORITIZE. THIS HEARING IS A STEP IN THAT PROCESS. WE MUST STUDY THE MERITS OF THE SSC, INCLUDING THE SITE SELECTION PROCESS WHICH IS THE SUBJECT OF TODAY'S HEARING.

TOMORROW, THE ENERGY RESEARCH AND DEVELOPMENT SUBCOMMITTEE IS SCHEDULED TO MARK UP ITS DEPARTMENT OF ENERGY CIVILIAN R&D AUTHORIZATION. I COMPLIMENT THEIR INITIATIVE AND SPEED TO ACT IN AN EFFORT TO GET THE SENATE TO MOVE A BILL FOR THE FIRST TIME SINCE THE EARLY 80'S. I NOTE THAT THE SSC IS EXPECTED TO BE FULLY FUNDED IN THAT MARK. I ALSO NOTE THAT THE SUBCOMMITTEE MARK IS

GOING TO BE AT LEAST $450 MILLION OR ABOUT 15% OVER BOTH DOE'S REQUEST AND CURRENT FUNDING LEVELS. THAT LEVEL WILL CAUSE ME A NUMBER OF SERIOUS PROBLEMS AND I SUSPECT THAT THERE WILL BE A SERIES OF AMENDMENTS AT THE FULL COMMITTEE LEVEL. MR. CHAIRMAN, I LOOK FORWARD TO FURTHER STUDY. THANK YOU, MR. CHAIRMAN.

Chairman ROE. At this time, I would recognize our distinguished ranking member from New York, Mr. Sherwood Boehlert.

Mr. BOEHLERT. Thank you, Mr. Chairman. I know you want today's hearing to focus exclusively on the siting issues, so I will make my opening comments very brief.

Our focus this morning reminds me of a comment made by the Canadian Prime Minister, John Diefenbaker. He lamented once that his country suffered from having too much geography, and too little history. I think the same can be said for our SSC policy.

We focus too much on which location was going to get the immediate benefits of a massive public works project, and too little on where we are at this point in history, at a time of budget deficits, economic challenge, and growing international cooperation in science.

I simply hope, Mr. Chairman, that after we conclude today's exploration of the question of where to build the SSC, we return to examine the precursor question of why and when. Thank you.

[The complete statement of the Honorable Sherwood Boehlert follows:]

HON. SHERWOOD BOEHLERT (R-NY)

SSC HEARING

April 4, 1989

Mr. Chairman:

I know you want today's hearing to focus exclusively on the siting issue, so I'll make my opening comments very brief.

Our focus this morning reminds me of a comment by the Canadian Prime Minister John Diefenbacker. He lamented once that his country suffered from having too much geography and too little history.

I think the same can be said for our SSC policy. We've focussed too much on which location is going to get the immediate benefits of a massive public works project and too little on where we are at this point in history -- a time of budget deficits, economic challenge and growing international cooperation in science.

I simply hope, Mr. Chairman, that after we conclude today's exploration of the question of <u>where</u> to build the SSC, we return to examine the precursor questions of why and when.

Chairman ROE. I appreciate the distinguished gentleman's comments from New York. May I respond to him, and say that it is the intent of the Chair that, as we wander through or work our way through these complex issues, that ultimately the committee will have to consider the details of the authorization, as I know you are aware.

If there are no other opening comments—the Chair would recognize the gentleman from Pennsylvania. Mr. Ritter is recognized.

Mr. RITTER. Thank you, Mr. Chairman. This year, we must evaluate whether we want to commit a significant portion of the federal science budget to the SSC. Even though the SSC may unlock some of matter's deep secrets, we have to recognize that it competes for very scarce research dollars.

Basically, the SSC has run into a budget-conscious Congress, and as yet we have no significant foreign commitment, plus DOE's federal R&D facilities must allocate billions of dollars to correct problems or promote the basic science projects which better underpin America's technological competitiveness.

Today, we want to look at the issue of whether the site selection process for the SSC was fair and equitable. Representatives from GAO and a DOE task force will testify about the site selection methodology. I am concerned that all of the witnesses today, Mr. Chairman, are basically in favor of the site selection process as it has evolved, and that there are not any dissenters.

We also have an expert on fire ants, to talk about the measures to control those pesky critters at the Texas site. Mr. Chairman, several of my colleagues are concerned, as I am, to find out whether DOE has cleared the first hurdle in managing the progress of this complex project: If we are satisfied that the DOE site selection process was adequate and fair, and believe that it can bring in the $6 billion SSC on time and within its budget.

Incidentally, just one year ago, the price tag was reported to be $4.4 billion. Although reasons given for the increase are the stretch-out of time and inflation, still, given the remarkable uncertainty over the SSC's central feature, the magnets' performance, one can only conjecture what the real costs will turn out to be.

DOE's task is not an easy one. Already, there are reports that the magnet design and construction is not proceeding smoothly, and could cost far more than planned.

I would ask unanimous consent, Mr. Chairman, that a recent article from *Science* magazine, dated March 17, 1989, on the magnet situation be entered into the record at this time.

Chairman ROE. Without objection, so ordered.

Mr. RITTER. Immediately following my opening remarks.

[The article submitted by Congressman Ritter follows:]

News & Comment

Will Magnet Problems Delay the SSC?

The Department of Energy wants $160 million next year to start constructing the SSC; Congress must decide whether to proceed or wait until some magnet problems are resolved

IN THE COMING MONTHS, Congress will decide whether to permit construction work to begin in 1990 on the Superconducting Super Collider (SSC). While it is wrestling with this $6 billion decision, physicists and engineers involved in the project are grappling with some difficult choices as well. Even as the particle accelerator moves toward a political turning point, some fundamental technical questions remain unanswered.

In recent weeks, officials from the Department of Energy (DOE) have assured congressional committees that there are no technical barriers that would compromise the undertaking. Scientists familiar with the project also are confident that the remaining details can be dealt with. What is uncertain, however, is how long it will take, and whether DOE will have to relax some of the performance goals for the machine.

The technical problems revolve around the collider's magnet system, which is expected to cost more than $1.5 billion. Still unsettled are such basic questions as the design of collars that play a critical role in clamping magnet windings to prevent loss of superconductivity through friction heating; the size of the magnet aperture; and the reliability and reproducibility of the magnets.

It is perhaps not surprising that there are still problems to be resolved, for building the machine will push accelerator engineering to the limit. Although the SSC is similar in many respects to other high-energy accelerators in the United States and overseas—much of its technology is based on systems developed for the Tevatron at Fermi National Accelerator Laboratory—the machine's colossal size, the energy with which the protons will smash into each other, and the project's huge cost set it apart from any particle accelerator ever built. Construction will require boring 53 miles of tunnel 165 to 200 feet underground, and the machine will use 10,000 superconducting magnets—each more powerful than any used on existing accelerators.

The SSC is designed to smash record numbers of protons together at record energies of 40 trillion electron volts (TeV). The magnets are the heart of the proposed SSC.

A 17-meter magnet *nears completion at Brookhaven National Laboratory.*

Their function is to confine trillions of protons orbiting in separate rings around the race-track-shaped accelerator. At the point that proton beams collide, detectors must record the hadrons, leptons, photons, and other particles that are produced.

To attain collisions with center-of-mass-energies of 40 TeV, the SSC's helium-cooled, superconducting magnets must operate at a field of 6.6 teslas, more than 50% higher than the magnets used in the Tevatron. If even one of the SSC's 10,000 magnets fails to perform at 6.6 teslas, the machine will not be able to operate at its ultimate design goal. The task of building prototype magnets is challenging because of the high field requirements, a relatively compact diameter, and their extraordinary 17.3 meter length (56.7 feet). Tevatron magnets, in comparison, operate at 4 teslas and are 6.4 meters (21 feet) long.

SSC engineers also have had to struggle to design collars to control coils of superconducting wire cable, which when energized produces the magnetic field. The stainless steel collars must clamp the precisely wound 16.75-meter magnet coils in place along the beam tube through which flow protons. Movement in the cable, even when cooled to 4.35 Kelvin, can produce enough resistance to create hot spots. In a fraction of a second this heat can cause an SSC magnet to cease operating in a superconducting state, thus losing magnetic field strength.

The difficulty in designing these clamps is reflected in the fact that of the 12 full-length test magnets tested so far, only 3 have operated at design specifications. The magnet builders have a delicate task: they must clamp magnet coils at room temperature with enough pressure to ensure that the cable windings will remain immobile as they cool and shrink, but they must not clamp them too tight. If the Kapton insulation breaks, the cable may be damaged.

The successful testing of 3 of the 12 long magnets suggests that the collar clamping problem may be solved. There is, however, continuing concern about the potential for metal fatigue at the point where pairs of collars are locked together with metal wedges called "keys."

This worry may be alleviated by redesigned iron yokes that clamp more uniformly around the SSC magnet collars. The aim is to eliminate tiny gaps within the structure that would allow the collars and cable to move when the magnet is energized. Designers also are shifting to a stronger stainless steel for the collars, says Carl Goodzeit,

deputy director of the magnet division at Brookhaven National Laboratory.

In addition to these mechanical difficulties, the SSC designers still face a fundamental decision on the size of the aperture or bore in the center of the magnet. An error here could reduce the number of observable proton collisions or "luminosity," and adversely affect experimental productivity of the SSC. The current design calls for a 4-centimeter aperture across the inside diameter of the magnet coils, but some physicists would prefer 5 centimeters.

Helen T. Edwards, a physicist who recently left Fermi National Accelerator Laboratory to head the SSC's accelerator systems division, told *Science* that she is concerned about two problems related to the narrow aperture. The first is having a sufficiently good magnetic field to maintain the 1 millimeter focus of the stream of protons as they shoot into the SSC from the injector ring. Second, there must be sufficient room to steer proton streams smoothly into a proper orbit. If the 4 centimeter aperture turns out to be marginal, she says, then operating the massive machine would be made difficult.

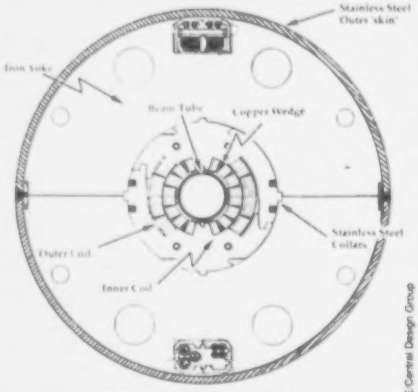
"Personally, I would design in as much operating margin as I could," says Fermilab's Richard Lundy, who played a large role in building the Tevatron accelerator magnets. He questions whether simulation models supporting the 4-centimeter aperture are fully reliable.

Erich H. Willen, a senior physicist at BNL, however, is confident that the 4-centimeter aperture will be sufficient. Should that not be the case, he says the accelerator could be fitted with additional correction magnets for steering the beam. Alternatively, the injection energy could be doubled to 2 TeV. The higher energy would help maintain beam focus by keeping protons bundled together more tightly. This also would hike costs and undermine the very reason for adopting the 4-centimeter aperture—to hold down magnet production expenses and overall project outlays.

Alexander W. Chao, head of the SSC Central Design Group's accelerator physics division, contends that the 4 centimeter aperture "has a reasonable safety margin." He concedes, however, that there is a question of whether there are unanticipated issues the simulation tests have not addressed. Ultimately, he says, "It is a policy issue of whether one wants to spend more money to increase the safety margin. The main concern is to have a collider that works."

A decision to adopt a 5-centimeter aperture would involve more than increasing magnet costs; it could delay the magnet production program by as much as 18 to 24 months, according to physicists and engineers at Brookhaven and Fermilab. This slight increase in aperture would require reconfiguring and retesting the magnets.

Roy Schwitters, the new director of the "SSC Laboratory" that is to be built in Waxahachie, Texas, hopes to settle questions about the aperture and other critical design issues within the next 6 months. All aspects of the supercollider's design will be subject to scrutiny, he says, as part of an audit being done by Universities Research Association (URA). DOE awarded the group the management and operations contract for the SSC in January. Although URA has run the SSC Central Design Group for the department since 1984, Schwitters says project plans still must be checked before the SSC program goes much further.



SSC dipole magnet cross section

DOE Central Design Group

Two outstanding issues that will not be cleared up in this review are magnet reliability and reproduceability. The SSC conceptual design calls for the magnets to perform for 20 years. Victor N. Karpenko, a mechanical engineer who was analyzing magnet reliability issues at the Central Design Group until last year, questions whether the design margins of magnet components are adequate to meet the advertised collision energy of 40 TeV on a regular basis.

He is not alone. "We have got to back down on the field or otherwise we are going to be operating on the hairy edge all the time," says one SSC official, who fears that the project could suffer from large numbers of magnet failures. Several program officials have told *Science* that DOE should consider settling for a collision energy of 35 TeV. This would help ease the potential operating and manufacturing problems related to the magnets without sacrificing much in the way of physics research.

Whether industry will be able to mass produce these magnets in an economic and timely fashion may not be clear for several years. DOE plans to bring industry into the magnet design and fabrication effort in 1990 and to have a number of companies make 5 magnets each in 1991. That process could produce further design changes. Until now, the CDG has conducted the research and designed the tooling largely with R&D support provided by Brookhaven, Fermilab, and Lawrence Berkeley Laboratory.

Indeed, the new SSC project management team being assembled by Schwitters may examine the merits of reducing the length of the 17-meter dipole magnets to about 6 meters, sources say. The shorter length might make magnet manufacturing and handling easier.

The question now facing Congress is whether to proceed with construction, or to wait and see if the magnets will have to undergo major design changes. The last thing SSC supporters want is for Congress to delay construction, as it did for fiscal year 1989. Raphael Kasper, incoming chief of staff for the SSC laboratory, says continued uncertainty about the country's commitment to the project will make it hard to recruit scientists and engineers.

Further delays also will hinder efforts to negotiate cooperative international agreements that could reduce U.S. outlays for the project by as much as $1 billion, says says Robert Diebold, director of DOE's SSC division. "I think we have shown that these magnets do work. We do have the proof-of-principle," says Diebold, arguing the Congress should push ahead with the SSC. What work remains to be done on the SSC magnets, he adds, "is just fine tuning."

Congress, however, may hesitate to accept 3 working magnets as a basis for allowing construction to proceed in 1990. Many legislators still remember the magnet problems that plagued Brookhaven's Isabelle accelerator (*Science*, 9 April 1982, p. 158) and the fact that the project was killed after $220 million was spent. Even more problematical, however, is the federal budget deficit and the desire of members to fund dozens of projects that are smaller than the super collider. Says an aide to one Republican member of the Senate Appropriations Committee, "right now no one wants to say 'no' and no one wants to say 'yes' to the SSC."

■ MARK CRAWFORD

[The complete statement of the Honorable Don Ritter follows:]

HON. DON RITTER (R-PA)
OPENING STATEMENT
HEARING ON THE
SITE SELECTION PROCESS FOR THE SSC
COMMITTEE ON SCIENCE, SPACE, AND TECHNOLOGY
APRIL 5, 1989

THANK YOU, MR. CHAIRMAN. THIS YEAR, WE MUST EVALUATE WHETHER WE WANT TO COMMIT A SIGNIFICANT PORTION OF THE FEDERAL SCIENCE BUDGET TO THE SSC. EVEN THOUGH THE SSC MAY UNLOCK SOME OF MATTER'S DEEP SECRETS, WE HAVE TO RECOGNIZE THAT IT COMPETES FOR SCARCE RESEARCH DOLLARS. BASICALLY, THE SSC HAS RUN INTO A BUDGET-CONSCIOUS CONGRESS. AS YET, WE HAVE NO SIGNIFICANT FOREIGN COMMITMENT. PLUS, DOE AND THE FEDERAL R&D ECONOMY MUST ALLOCATE BILLIONS OF DOLLARS TO CORRECT PROBLEMS OR PROMOTE OTHER BASIC SCIENCE PROJECTS WHICH BETTER UNDERPIN AMERICA'S TECHNOLOGICAL COMPETITIVENESS.

TODAY WE'RE HERE TO LOOK AT THE ISSUE OF WHETHER THE SITE SELECTION PROCESS FOR THE SSC WAS FAIR AND EQUITABLE. REPRESENTATIVES FROM THE GAO AND THE DOE'S TASK FORCE WILL TESTIFY ABOUT THE SITE SELECTION METHODOLOGY. WE'VE ALSO GOT AN EXPERT ON FIRE ANTS TO TALK ABOUT MEASURES TO CONTROL THOSE PESKY CRITTERS AT THE TEXAS SITE.

SEVERAL OF MY COLLEAGUES ARE CONCERNED, AS AM I, TO FIND OUT WHETHER THE DOE HAS CLEARED THE FIRST HURDLE IN MANAGING THE PROGRESS OF THIS COMPLEX PROJECT. IF WE ARE SATISFIED THAT THE DOE'S SITE SELECTION PROCESS WAS ADEQUATE AND FAIR, WE'RE MORE LIKELY TO BELIEVE THAT IT COULD BRING IN THE $6.4 BILLION SSC ON TIME AND WITHIN ITS BUDGET.

INCIDENTALLY, JUST ONE YEAR AGO, THE PRICE TAG WAS PURPORTED TO BE $4.4 BILLION. GIVEN THE STILL REMARKABLE UNCERTAINTY OVER THE SSC'S CENTRAL FEATURE, THE MAGNETS, ONE CAN ONLY CONJECTURE FURTHER INCREASES.

DOE'S TASK IS NOT AN EASY ONE. ALREADY THERE ARE REPORTS THAT MAGNET DESIGN AND CONSTRUCTION IS NOT PROCEEDING SMOOTHLY, AND COULD COST FAR MORE THAN PLANNED. I WOULD ASK, MR. CHAIRMAN, THAT THE RECENT ARTICLE FROM SCIENCE MAGAZINE, DATED MARCH 17, ON THE MAGNET SITUATION, BE ENTERED INTO THE RECORD. I AM HOPEFUL, MR. CHAIRMAN, THAT WE CAN EVALUATE THE SITE SELECTION PROCESS AND MOVE ON TO THE WEIGHTIER ISSUES THAT WILL DETERMINE THE VIABILITY OF THE PROJECT. THANK YOU, MR. CHAIRMAN.

Chairman ROE. If the gentleman would yield, I know there are strong feelings on this. I do not want to deter or in any way limit anyone's presentation, but I do trust that we will be able to concentrate our efforts on phase one, which is the fairness, versus the selection. I realize there is a difference of opinion, but let's try to stick to that.

Mr. RITTER. I have one more statement, Mr. Chairman. I am hopeful, Mr. Chairman, that we can evaluate the site selection process and move on with the project. Thank you, Mr. Chairman.

Chairman ROE. Thank you, Mr. Ritter. The Chair recognizes the distinguished gentleman from Illinois, Mr. Bruce.

Mr. BRUCE. Thank you, Mr. Chairman. Let me say that I appreciate the efforts of the Chairman and am mindful of his comments concerning the interest of this committee on the site selection process and how we got where we are.

While my home state of Illinois was not chosen for the SSC, I remain highly supportive of maintaining our nation's position as a leader in high energy physics.

In providing a sound economical, geological, and environmental location on which to begin construction, the Department of Energy conducted lengthy studies on the merits of each site's proposal. However, I believe the work of the task force was crucially flawed in many areas.

The Governor of the State of Illinois, in response to these concerns, has asked me to submit to this committee, for the official record of this committee, a report reviewing the problems in the site selection process. This report clearly identifies disturbing inconsistencies in the Department of Energy's SSC site evaluation.

Among the highest of my concerns as set forth in that report is that, at the Illinois debriefing conducted by the Department, it was revealed that the rating of six technical criteria upon which the decision to site the SSC was based were made as early as September 18th, 1988. This suggests that the SSC site selection decision was based on early, incomplete, and inaccurate information, since the state's corrections to the draft environmental impact statement had not yet been delivered to the department; and once delivered, the Department of Energy saw fit to mail that, the complete EIS statement, to people around the United States, at a cost of over one million dollars.

Other areas include discomfiting information on the technical expertise of the individuals conducting the evaluations, for which they did not have the required qualifications; the application of subjective, vague, and non-comparative methods for evaluating and selecting the preferred site, that demonstrate pervasive inconsistencies within DOE's own documents and within and between site-specific evaluations.

These inconsistencies and concerns with DOE's site evaluations must be reviewed before a project of this magnitude is funded, at a time of fiscal constraints. I look forward to the testimony of the witnesses, in order to gain a better understanding of these decisions, reviewing completely, as the Chairman indicated, the site-selection process.

Mr. Chairman, at this time I would like to submit for the record a covering letter by the Director of the Department of Energy and

Natural Resources of the State of Illinois on behalf of the Governor, and review and comment on the site selection evaluation by the Department of Energy on the Superconducting Super Collider, dated March 8, 1989.

Chairman ROE. Without objection, the statements will appear following the gentleman's statement.

[The letter and report submitted by Congressman Bruce follows:]

STATE OF ILLINOIS
DEPARTMENT OF ENERGY AND NATURAL RESOURCES
SPRINGFIELD
62704-1892

KAREN A. WITTER
DIRECTOR

April 3, 1989

The Honorable Robert Roe, Chairman
Committee on Science, Space and Technology
U.S. House of Representatives
2321 Rayburn House Office Building
Washington, D.C. 20515

Dear Chairman Roe:

Thank you for the opportunity to present a statement to the Committee on Science, Space and Technology at its hearing on the site selection process for the Superconducting Super Collider (SSC). You and the committee are to be complimented for your interest in this important topic.

I serve as the Director of the Illinois Department of Energy and Natural Resources, which has been designated by Governor James R. Thompson as the lead state agency for Illinois' SSC project. Illinois was one of twenty-five states that proposed sites for the SSC. The State of Illinois proposal reflected both the desirability of the SSC facility and our belief in its role as essential to United States leadership in high energy physics. Our proposal was backed by a four-year program of progressively focused research undertaken by 200 member team of experts. It contained reliable, accurate and complete information on the proposed Illinois site and documented the excellent site geology, unmatched regional resources, minimal environmental impacts and numerous other attributes that Illinois could offer. The Illinois proposal presented a site that was, by any measure, one of extraordinary merit.

Perhaps the greatest asset that Illinois had to offer in the bid for the SSC was the Fermi National Accelerator Laboratory. According to a study prepared by an independent panel of business consultants, building the SSC at Fermilab would save the federal government at least $3.28 billion in these tight budget times, while preserving the research capability of the nation's premier facility for high energy physics research.

The Illinois effort to win the SSC was founded on the highest levels of cooperation among individuals and agencies that historically represented opposing, different or diverse views. The project received unanimous,

bipartisan support from the Illinois General Assembly and Congressional Delegation. It gained an unprecedented level of commitment from the business and research communities, universities, organized labor, local governments, civic groups, other states and the vast majority of private citizens.

Because of these factors, Illinois was considered the front runner by many who followed the site selection process. After the Secretary of Energy announced that Texas had been selected as the preferred site, the Illinois Department of Energy and Natural Resources initiated a review of the site selection and the Illinois application. The results of that review are included in the attached report.

The State of Illinois continues to support the SSC. I would like to submit this report on the site selection process for the record and for the Committee's deliberations.

Sincerely,

Karen A. Witter

Karen A. Witter
Director

KAW/jb

0203sy

State of Illinois
Review and Comment on the
Site Selection Evaluations
by the U.S. Department of Energy
for the
Superconducting Super Collider

March 1989

Department of Energy and Natural Resources

EXECUTIVE SUMMARY

On September 1, 1987, the Honorable James R. Thompson, Governor of the State of Illinois, submitted to the United States Department of Energy (USDOE) the Illinois proposal for siting the Superconducting Super Collider (SSC). This proposal represented an intensive study by all facets of local and state government and the private sector. The State of Illinois proposal demonstrated the best in cooperative effort and unity of purpose between state government, private entrepreneurs, educational institutions and the Illinois Congressional Delegation. The Illinois proposal was eventually one of eight proposal submissions on a Best Qualified List (BQL) as determined by a blue-ribbon committee of experts from the National Academies of Science and Engineering. In addition to being chosen as one of the best sites for the SSC, the Illinois proposal was unique because it incorporated the use of the Tevatron at Fermilab; thus following the lead of world-class accelerator installations.

The Illinois Department of Energy and Natural Resources (ENR) prepared the Illinois SSC proposal and worked directly with USDOE to provide necessary information to complete the proposal submission and site selection process. ENR also closely monitored the site selection process and maintained a high level of interest and participation in events allied with the SSC.

On November 10, 1988, the Honorable John S. Herrington, Secretary of Energy, USDOE, announced that Waxahachie, Texas was the preferred site for the SSC. Illinois, while continuing to support the SSC project, initiated a review of the development of its proposal and the USDOE site selection process.

During this period of inspection, the Illinois SSC Task Force and the Illinois Congressional Delegation were debriefed on the evaluation of the Illinois proposal by USDOE. This debriefing, held on December 7, 1988, revealed that the ratings of six technical criteria upon which the decision to site the SSC in Texas was based were made as early as September 18, 1988. This suggests that the SSC site decision was made on the basis of early, incomplete and inaccurate information, since corrections to published USDOE interpretations had not yet been delivered to USDOE. This fact, along with a mounting list of inconsistencies discovered in USDOE's SSC Site Evaluation, the definitive document supporting their recommendation, and other information resulted in a comprehensive appraisal of the USDOE site selection process.

This report does not lessen Illinois' support for the SSC project. However, it is intended to document the serious, perhaps fatal, flaws that compromised the site selection process that the many site proposers were asked to follow. Specifically, we find that the USDOE Site Task Force:

- o Assigned ratings prior to the reception and assimilation of corrections to information used to establish those ratings.
- o Failed to perpetuate the site selection process established for the determination of a BQL.
- o Applied subjective, vague and non-comparative methods for evaluating and selecting the preferred site.
- o Demonstrated a pervasive inconsistency within its own documents and within and between site-specific evaluations.
- o Assigned technical evaluation responsibility to individuals without proper technical expertise.
- o Ignored responsible and responsive suggestions for mitigation of adverse impacts by the SSC.
- o Adopted a policy biased toward a new site rather than an upgraded existing site and, in so doing, failed to educate its members on world-wide experience with high-energy instruments located in urban areas.

- o Refused to accept significant potential savings to the taxpayers by locating the SSC at Fermilab.

The State of Illinois is presenting this report to establish a clear record of the site selection process in order to preclude a similar degradation of such processes in future projects.

BACKGROUND

The central goal of the U.S. Department of Energy's (USDOE) site selection process for the Superconducting Super Collider (SSC) was to "select a site that will permit the highest level of research productivity and overall effectiveness of the SSC facility at a reasonable cost of construction and operation and with minimal impact on the environment." (Invitation for Site Proposals -- Superconducting Super Collider (ISP), April, 1987, p. 27.)

To pursue this goal, the U.S. Department of Energy established comprehensive and detailed procedures for selecting the most excellent sites for the Best Qualified List (BQL) and ultimately, the one preferred site for the SSC. Important steps in this 18-month process included establishment of technical and cost criteria for judging sites, as set forth in the ISP, Section 3; formation of review committees for site assessments, including USDOE's internal Site Task Force (STF), with major responsibilities for developing the ISP, evaluating the BQL sites and complying with the National Environmental Policy Act (NEPA) requirements and the external committee of experts from the National Academies of Science and Engineering, which recommended to USDOE eight sites for inclusion on the BQL; and actual visits to all BQL sites.

The State of Illinois submitted a comprehensive and quality-assured proposal developed from a complete and detailed data base. The proposal was designed to show not only that the Illinois site had superior technical attributes, but also that its unique characteristics could provide the most

productive scientific facility at the lowest cost. Further, using guidelines set forth in the National Environmental Policy Act (NEPA), the State of Illinois developed and presented its own Environmental Impact Assessment as part of the supplemental material delivered to USDOE in March and April, 1988.

The publication in August, 1988, of a draft Environmental Impact Statement (DEIS) by USDOE brought the site selection process near completion. This document, which was intended to point out real and potential impacts of the SSC at each of the seven BQL sites (those remaining after the withdrawal of the New York proposal), contained numerous factual inaccuracies and omitted pertinent data about the Illinois site. During the 45-day public comment period following publication of the DEIS, the State task force provided appropriate corrections in the form of an extensive, thoroughly cross-referenced written submission and oral testimony. The State of Illinois delivered oral comments on the DEIS on October 6 and 7, 1988, and written comments on October 17, 1988. The State's Environmental Impact Assessment was resubmitted at this time.

On November 10, 1988, USDOE announced that Texas would be the host for the SSC and released a report entitled SSC Site Evaluations (SE): A Report by the SSC Site Task Force (DOE/ER-0392). This report is the definitive document to support the STF's recommendations and USDOE's choice for the preferred SSC location site at Waxahachie, Texas. USDOE then scheduled individual meetings with officials from the BQL sites for debriefing. The Illinois meeting was held on December 7, 1988, in Washington, D.C.

The Illinois Department of Energy and Natural Resources has analyzed the SE document, the statements made by USDOE officials in the debriefing session and relevant documentation provided by USDOE upon request. Based on the information we have, we believe that the site selection process was seriously compromised. The purpose of this report is to document our findings.

FINDINGS

The following are the major findings which lead to the determination that the process of selecting a final site for the SSC from the BQL was flawed.

1. USDOE's decision was based on inaccurate and incomplete information.

At the December 7 debriefing, USDOE stated that ratings for the sites were assigned as early as September 18, 1988, and completed by September 25, and did not change after that date. Since the official comment period on the DEIS did not close until mid-October, we are concerned that USDOE used incorrect information in assigning the ratings.

For example, Illinois submitted corrected information on the Setting and Environment criteria relating to the potential numbers of wells and real estate parcels affected by the SSC. While this information addressed specific points critical to an accurate evaluation of the Illinois site, the SE report was not changed to reflect the corrections and the ratings on these criteria remained the same, although the corrections were used in the Final Environmental Impact Statement (FEIS), issued after the SSC site decision was announced. Another example is the Texas rating of "excellent" for Environment,

even though new information came to light on the impact of fire ants on SSC construction and operation at the Texas site. While this impact was recognized in the FEIS, Texas' evaluation remained unchanged. Though the Site Task Force says it reviewed summaries of the DEIS comments, it is improbable that they were given the weight they deserved, since the thousands of pages of DEIS comments submitted did not result in changes to any of the ratings initially assigned in September. The information that USDOE used to make its final decision did not reflect the totality of the record, and, in some cases, was apparently based on inaccurate data.

2. The rating system used was subjective and vague.

The major technical criteria for judging the sites (in descending order of relative importance) were:

Geology and Tunneling
Regional Resources
Environment
Setting
Regional Conditions
Utilities

These criteria and associated subcriteria (listed in Appendix C of the ISP) were evaluated by a methodology approved by USDOE's Energy Systems Acquisition Advisory Board (ESAAB), which required the use of adjectival ratings. According to USDOE, each important siting criterion was discussed by the Task Force until a consensus was reached on a rating for each State (e.g.,

"outstanding," "good," "satisfactory," "poor," or "unsatisfactory"). No numerical rankings were assigned, and no comparisons between sites were made.

It is Illinois' position that allowing final recommendations and judgments to be made on the basis of group consensus "feelings" undermined the importance of actual data, studies and measurements of each site, while unduly emphasizing individual impressions. The ratings give the ultimate decision the appearance of being made on quantifiable and comparative standards when, in fact, they were made as the result of administrative discretion on a non-comparative basis. Although notice of the criteria and subcriteria were set forth in the ISP, the methodology for judging these factors was not.

The evaluation process also shows a lack of comparability between the technical criteria used to evaluate the sites. For example, Geology and Tunneling are considered the most important of the technical criteria for the SSC, but USDOE fails to state how important. Failure to weight criteria prevents a relative comparison between, for example, an "outstanding" for Geology and Tunneling with a "good" for Regional Resources. In fact, the U.S. General Accounting Office (GAO) concluded that USDOE did not adequately inform site proposers on the actual weight given to regional resources. Specifically, the GAO recommended that "potential site proposers be given the maximum information possible in the invitation about the relative importance of the selection criteria." (Determination of the Best Qualified Site for the DOE's Super Collider, GAO/RCED-89-18, p.59)

The SE document does not allow useful comparisons between criteria and between sites. Furthermore, the Site Task Force indicated that its members were judging each proposal in relation to an "ideal site." This ideal site

was not described in the ISP and amounts to a mid-course change in the rules that was not disclosed. Further, new site factors, such as the importance of the physical location of the SSC in relation to electric generating stations, were not revealed until the December 7, 1988 debriefing.

3. Ratings do not correlate in meaning.

It is important to note that Dr. Wilmot Hess, Chairman, SSC Site Task Force, states the STF did not " . . . rank the sites in comparison to one another, nor did it evaluate cost trade-offs" (SE p.i). Examination of specific ratings indicate a lack of consistency between individual site evaluations. "Geologic suitability," for example, was rated "outstanding" for Illinois, Tennessee and Texas, notwithstanding the existence of non-predictable karst features at the Tennessee site and the existence of faults and soft rock tunneling problems at the Texas site. These weaknesses in geologic setting are well known by geologists and civil engineers. Even ratings applied to a site in terms of the "ideal" site and not as comparative ratings between sites should still have some correlation in meaning.

The ISP was intended to provide a standard by which all of the BQL sites could be evaluated. However, without true comparison, it is improbable that the STF could properly evaluate the sites. Without point-by-point comparison or reporting, advantages (or disadvantages) are not clear. More importantly, in such an analysis may overlook or underestimate relative levels of risk, and therefore a site may not be free of fatal flaws.

4. STF members lacked requisite technical expertise.

The Executive Summary of the SE report (pp 3-4) notes that the lead responsibility for each technical evaluation criterion and the life-cycle cost was assigned to an individual Task Force member. One would expect that each criterion would be judged by a Task Force member with demonstrated expertise in that area. However, a review of the officials involved in the ratings determined for the most important technical criteria, Geology and Tunneling, reveals no geologist among the Site Task Force members and only one civil engineer. Further, only one geologist is included in the SSC Task Force's Technical Support and Advisors list. Thus, for this most important of technical criteria, it appears that USDOE did not fully utilize the talents and expertise of trained geologist evaluators.

5. Lack of data was evaluated as a strength.

The SE report indicates that a substantial data base provided more of a focus for determining an impact or problem rather than providing assurances that mitigation of the impacts or problems could be accomplished. For example, in the area of "environmental impact" the report notes as a weakness that "numerous prehistoric cultural resource properties have been identified" at the Illinois site. However, Illinois suggests that "identification" is not synonymous with "weakness." Identification is a strength since it is the basis used to mitigate and prevent impacts. Where insufficient data are presented the possibility exists for pre-construction discoveries to create costly delays. The State of Illinois did conduct extensive archeological surveys at the proposed SSC site. Over 2000 acres were examined and 284

probable sites investigated. Compare such a comprehensive investigation with this statement, taken from p. 137 of the DEIS, Volume IV, appendix 5C with reference to the Texas site: "Relatively few archaeological studies have been completed in Ellis County." The STF rated Texas "outstanding" on Environment with minimal expected impacts; however, the potential impacts are actually unknown. If lack of knowledge is evaluated as a strength and extensive knowledge a weakness, then there is a question as to whether scientific credibility and quality-assured data were even necessary for the site selection process.

6. Mitigation strategies contained in Illinois' Environmental Impact Assessment were not evaluated.

The USDOE has failed to acknowledge the State of Illinois' Environmental Impact Assessment, which has been officially submitted twice, initially in April and again during the comment period following release of the DEIS. Specific areas of impact and a plan for the mitigation of those impacts were identified and presented in the State's document. Many of these same impacts were evaluated by the STF for the Illinois site but apparently without the input provided by the Illinois SSC Environmental Impact Assessment for mitigation of those impacts. These included (but are not limited to):

- The conceptual possibility of placing all six experimental areas on Fermilab property in one experimental cluster.
- A preferred placement of the main collider ring to minimize disturbance to existing structures, roads, wetlands, cemeteries, and other sensitive features.
- A preferred placement of shafts and acreage to follow existing road rights-of-way, property lines, subdivision boundaries, natural area delineations, and other land uses.

- o Joint SSC-Fermilab use of existing Fermilab water wells to meet water needs.
- o Water connections to existing systems that are close to SSC surface sites.
- o A water well located to serve both the SSC and local needs.
- o A wastewater treatment plant sized and located to serve both the SSC and local needs.
- o Minimum possible lengths for access roads to surface/shaft locations and pavement of access roads to eliminate fugitive dust.
- o Use of quarry and/or gravel pits around the ring to minimize spoil haul distances.
- o Continuation of the USDOE agricultural lease-back practice at the SSC site.
- o Management of the tunnel excavation by the State in order to maintain State control of potential disruption or property damage.
- o The establishment of a Citizens Mitigation Task Force and other public participation programs to assist the State and USDOE with the development of effective mitigation of human impacts.
- O Adjustments to the location of the SSC surface facilities is specifically allowed by the terms of the ISP, however, Illinois' "setting" evaluation was downgraded by the STF because of adjustment the State suggested in its proposal.

Full consideration of these suggestions would have greatly enhanced the Illinois evaluation. Instead, they were not mentioned, thus raising the question if they were even reviewed. If USDOE had seriously considered the mitigation strategies relating to physical layout and configuration of the SSC, the rating of "poor" for the Setting criterion would very likely have been upgraded. USDOE's concern about the number of real estate parcels affected was directly addressed by Illinois' suggestions for optimum layout of the SSC. Similarly, USDOE was concerned about placement flexibility and interference by man-made features in the site area. In fact, Illinois' mitigation strategies showed a great deal of flexibility in ring placement,

and impacts on the facility due to the proximity of urban development could easily have been minimized.

7. USDOE did not adequately and fully consider all aspects of building the SSC at Fermilab.

Throughout the Site Evaluation Report and the entire selection process, USDOE downplays Illinois' proposed use of Fermilab. USDOE somehow does not equate the existence of Fermilab with "strength" at the Illinois site. Fermilab itself is the most significant man-made feature in the Illinois setting, and USDOE has consistently ignored many favorable aspects of the use of the Tevatron in SSC operations. These strengths include the ability to build upon the existing expertise and experience found only at Fermilab, thus following the established practice at every other major accelerator in the world. However, at the debriefing session on December 7, the STF admitted that it did not send any member to visit either the DESY laboratory in Hamburg, West Germany, or the CERN site in Geneva, Switzerland. These two major European laboratories have recently added accelerators in tunnels to existing machines and both have done so successfully in urban areas and in geologic settings less favorable than in Illinois.

The information and experience gained from such a visit would have provided valuable insights into the evaluation of any proposal. The STF concluded that it would be difficult to add to an existing machine in an urbanized area. Yet, that is exactly the practice at other accelerator construction projects. The Task Force has no firsthand experience from which to judge the merits of such an installation. We must conclude that USDOE made

a policy decision biased against building on an existing facility and ignored such up-grade examples during the evaluation process. It also appears that USDOE was predisposed to build a brand new facility and thus, does not acknowledge, much less score, the many obvious strengths of using Fermilab. Also lacking is consideration of the uniqueness of the Illinois proposal because a major part of the SSC already exists at the site. In its zeal to give the appearance of uniform scoring factors, USDOE through the STF has ignored this major difference between Illinois and other sites.

More importantly, the basic policy issue of whether the United States' future high energy physics program should build upon existing programs and facilities was never fully addressed. To USDOE, the Fermilab issue became simply an economic question, rolled into a plethora of uncertain cost issues over a 25-year SSC life span. Thus, the very real and immediate cost savings achievable at Fermilab were considered on the same level as such cost items as labor, supplies and utility rates in the year 2020. The difference is that the Fermilab savings can be counted on now, while the later are speculative and open to debate. USDOE summarily dismissed the basic premise that our national research program should capitalize on hard-fought gains already made. In its place, USDOE opted for a "new-is-better" philosophy, never fully considering the impacts of spreading our country's precious human resources in the select field of high energy physics research.

TECHNICAL EVALUATION CRITERIA

In the preceding section, the findings of the Illinois Department of Energy and Natural Resources characterize problems associated with USDOE's

handling of the site selection process. In addition to the above findings, further scrutiny of USDOE's evaluation of the specific technical evaluation critera emphasized problems and weaknesses in the site selection process. The following describes specific areas where the USDOE made technical errors.

Geology and Tunneling

Operational Efficiency, one of the subcriteria under Geology and Tunneling, was rated "poor" for Illinois. This rating appears inextricably tied to depth of operation both in tunnel and experimental chambers. The ISP states (p. 46):

> "The best overall depth for the collider ring tunnel is largely determined by the land topography and the geological strata along the alignment of the collider tunnel."

Although recognizing depth may be a cost consideration, the ISP further states (p. 46):

> "As a practical matter, it is desirable that shaft depths be no more than several hundred feet."

Illinois placed the tunnel and experimental halls at a depth of less than 500 feet in a homogeneous unit almost unique to the proposals submitted and was judged "poor." Arizona had depths of up to 1,000 feet, clearly more than "several hundred," and was judged "good." More important is the fact that the depth of the Illinois tunnel presents no technical barriers to either construction or operation. It is not unusual to place large projects at this depth. For example, the City of Chicago's pollution and flood control project, TARP, is at depths comparable to the SSC's proposed site.

Illinois is also not cited as having any noteworthy strengths. No consideration is given to the efficiency that will result from the substantial data base and engineering information available. The fact that no unmanageable water inflow problems will be encountered is also undeniably an operational efficiency.

Regional Resources

USDOE insists on characterizing Citizens Against the Collider Here (CATCH)-Illinois as "strong, organized opposition." This characterization is incorrect in the context of the report in that it implies that CATCH is large and represents a significant percentage of the area population and impacted land owners of fee-simple areas. Illinois' experience and evidence from public meetings shows that CATCH-ILLINOIS has a core membership listed at about 150 addresses who have become vocal in their opposition to the siting of the SSC in Illinois. However, lawsuits filed by this organization against the state and federal government agencies have been fully adjudicated in favor of USDOE and the State of Illinois. Furthermore, the organization has been ineffective in influencing the position of elected officials, community leaders or the local media. From USDOE statements made at the December 7 debriefing, it is clear that USDOE assumed the opposition to be much larger, based on unverified petitions and casual conversations.

The suggestion that "local government support has started to erode" has little evidentiary basis. On the contrary, local support is very strong and concerns are more for what path mitigation should take and how it can best be implemented. Illinois recognizes the contribution that can be made by its

citizens, even those not supportive of the SSC project. The State has been attentive to opposition with the passage of the "Good Neighbor Bill," to protect property owners and local taxing entities and members of CATCH-ILLINOIS were included on the Citizens Mitigation Task Force, whose report was submitted as part of the State's response to the DEIS.

Environment

It is incorrect to state that there would be "minimal impacts on mineral or oil/gas resources" in Illinois when, in fact, there would be no impact on these resources. The "minimal" statement is especially numbing when viewed in the context of the corresponding assessment for Texas, which states "No impact on mineral resources is expected." Further, Illinois' "non-impact" on mineral resources is known, not "expected."

The SE fails to note that resource impacts at the Illinois site are negligible or nonexistent. The comment that "many other resource category impacts would be moderate" for Illinois is not consistent with a similar statement of "low" for Texas, when only 0.01 percent of the Illinois regional inventory of prime farmland would be affected, compared to 0.02 percent of the Texas regional inventory.

The reference in the SE to an existing regional groundwater overdraft condition at the Illinois site is misleading. Illinois' repeated oral and written submissions to USDOE showed conclusively that the SSC would not exacerbate the existing overdraft in the deep aquifer system. There is a surplus of water in the shallow aquifer system that easily meets the SSC's requirements.

USDOE evaluates the impact of noise in terms of a percentage of individuals (human receptors) who are affected by an increased noise level. The SE states (p. 67) that ". . . numerous residences are within the 'annoying noise level' contours around the service area." This statement, without technical qualification and quantification is, or can be, misleading to all but well-informed noise-assessment engineers. Examination of USDOE information shows that the receptor would, generally, have to be located within 1,750 ft. of a service area during the peak (construction) phase of noise generation to be "highly annoyed." Thus, 6-acre service areas should not present a major impact and the smaller (0.9 acre) areas will only present impacts during the construction phase. Furthermore, generalized statements such as those made in the SE regarding noise levels obscure the significant difference between construction and operational noise levels.

The "high potential" for socioeconomic impact is clearly an overstatement. Illinois estimates some 219 relocations would be necessary, a number not significantly higher than other BQL sites (e.g., Texas reported as having 175 in the SE and 224 in the DEIS) to support differences in rankings. Furthermore, Illinois' suggestions concerning alternative placement and configuration of the SSC could have greatly reduced the number of forced relocations as has been accomplished at other major accelerators in the world. By placing all experimental areas on Fermilab's existing 6,800 acre campus and adjusting surface access areas around the ring, the land acquisition impacts would have been reduced dramatically. Yet, USDOE continued to ignore these responsible alternatives and concluded that the Illinois site lacked flexibility and would have major impacts on landowners.

Setting

The Task Force evaluated Illinois as "Poor" for this criteria, a rating which we believe is clearly unwarranted. Two important factors USDOE discounted are 1) Illinois has quick-take authority for the SSC and 2) the State has always proposed a multi-agency approach for this project which included the Illinois Department of Transportation and the Attorney General, both actively involved in land acquisition programs. The quick-take authority not only allows the use of eminent domain procedures to acquire land, but it provides for very speedy acquisitions, within 30 days of filing the case in court. Without the quick-take authority, land acquisitions can take several months, even years, in the judicial process.

The statement that the Illinois Department of Energy and Natural Resources (ENR) would rely solely on a contractor for land acquisition is incorrect. Illinois, in fact, suggests a comprehensive plan utilizing the resources of several State agencies in concert with private contractors when needed. Furthermore, both Arizona and Colorado planned to use a contractor for land acquisition and were assigned "Good" ratings. Specifically, the Site Evaluation Report states for Arizona, ". . . the plan for acquisition of the real property has not been well developed. Arizona will utilize a private contractor, managed by the Arizona Department of Transportation, for real estate acquisition." For Colorado, "the State team did not include experienced real estate acquisition personnel, and they did not plan to utilize a state agency with acquisition experience. Instead, the State planned to hire a contractor with the requisite experience to support their efforts." No explanation is given as to why similar intentions were rated so

differently. In fact, the Illinois proposal described several key management positions for the land acquisition task which would be hired on ENR's staff. Individual tasks would then be contracted out, subject to staff oversight.

It is also important to point out that, of the total number of parcels identified in Illinois, only 437 are fee-simple parcels, compared to 434 for Tennessee and 318 for Texas. Both Tennessee and Texas received "outstanding" ratings. Additionally, most Texas relocations are either rural or house trailers. Experience has shown that the most serious socioeconomic problems are associated with forced relocations of rural and lower income residents, who are generally the least well equipped to re-establish themselves successfully.

Finally, Illinois has proposed mitigation plans that include shifting some surface areas to avoid impact on man-made features. Rather than look upon these plans as a positive and enhancing feature of the State proposal, USDOE opted to consider them a weakness. In the Setting STF subcommittee report provided by USDOE to Illinois in January, 1989 (but written in September, 1988 for the Task Force) it is, for the first time, explained that if a state made adjustments in USDOE's SSC template, the state "received an 'M' notation which is similar to poor" (unnumbered page 4). This rating system was unknown to states when preparing their proposals, and in fact, the ISP indicated that adjustments to the template, within several hundred feet, were allowable (ISP p. 50).

The State of Illinois did not and does not anticipate any delays in acquisition of the land for the SSC. The Governor of the State of Illinois

and the Illinois General Assembly have committed to this project, by overwhelming bipartisan action, sufficient funds and the necessary legislation to deliver its commitment on schedule. Even USDOE admitted at the December 7 briefing, "the State of Illinois probably would be successful, had they been chosen, to acquire the land and maintain our schedule." A strength not attributed to the site is that the 6,800 acres at Fermilab are already in possession. Add to this head start the facts that the State of Illinois has legislation in place, funding appropriated, and no deterrent to beginning construction on schedule, the rating of "Poor" cannot be justified.

Regional Conditions

Vibration is the key issue under this criterion. Illinois is concerned about USDOE's disregard for any quantitative assessment on this subject. Table I is a compilation of rating and associated tolerance values (where noted) as reported in the SE.

TABLE I

STATE	RATING	BELOW TOLERANCE VALUE
Arizona	Satisfactory	2 - 4
Colorado	Outstanding	?
Illinois	Good	30 - 100
Michigan	Outstanding	?
N. Carolina	Satisfactory	Limit charges at quarries
Tennessee	Outstanding	10
Texas	Good	2 - 4

This table shows a value given to a site in terms of a vibration tolerance for the SSC site. The numbers represent a factor (multiplier) below the vibration level allowable for the instrument to function properly and the

table relates this value to the rating assigned by USDOE. Note that Tennessee receives an "Outstanding" with a tolerance level of 10 times lower than the required value. Note also that Illinois is rated "Good" for measured values which are from 30 to 100 times lower than required. Texas receives a higher rating (Good) than Arizona (Satisfactory) with identical values (2-4) but, more interestingly, the Texas site has a railroad line within a specified 35-foot radius primary safety shield. Such a situation is a direct violation of the ISP specifications, yet the Texas rating is above that of Arizona and equal to Illinois.

Climate

Evaluation of this area shows great confusion as to what constitutes strengths and weaknesses, and USDOE's internal inconsistency is once again encountered. Both Illinois and Colorado receive about 30 inches of snow annually, yet for Colorado this is a strength and for Illinois a weakness. No mention is given to North Carolina's weather problems which include tropical storms, or to the high temperature and humid conditions that prevail at the Texas site.

Utilities

All of the BQL sites were rated "Good" for utilities which, after a comparison of the sites is made, defies rational explanation. Table II is a matrix of the ratings by each sub-criterion.

TABLE II
UTILITY COMPARISONS

CRITERION	AZ	CO	IL	MI	NC	TN	TX
UTILITIES	G	G	G	G	G	G	G
Electricity	G	G	G	G	G	G	G
Water	S	S	G	G	S	G	G
Other	G	G	G	G	G	G	G

This table shows that each site was rated "good" for electricity (electrical power availability). However, Arizona needs extensive new transmission lines to accommodate construction and operation and Colorado will require the services of three utilities, including one multi-jurisdictional utility and a rural electric co-op. Michigan must combine two electrical utilities, as must North Carolina and Texas. Tennessee must construct many miles of new lines. Only Illinois has a single major electric utility, Commonwealth Edison, with the capacity, all but 1.5 miles of line in place, and the experience with delivery of the magnitude of pulsed loads required for SSC operation. It is incomprehensible that this experience and capacity are ignored and reduced to the statement "A strong electrical power generation and transmission system is available."

LIFE-CYCLE COST

It is difficult to judge the accuracy or rationality of the SE on the subject of Life-Cycle Cost (LCC) because there is so little information given in this section. Several additional reports must also be read, which for Illinois, include: the Illinois Proposal, Volume 6, pp 6.4 - 6.8 (The Value of Fermilab); the October 1987 report, Analysis of the Fermilab Tevatron as an

Injector for the SSC prepared for USDOE by a committee chaired by Dr. R. Siemann (the "Siemann Report"); the A.T. Kearney, February 1988, report, Siting the SSC at Fermilab - an Independent Cost Study; USDOE's Review of the A.T. Kearney Study, October 20, 1988; USDOE's memorandum "Potential Savings in Campus Building and Site Infrastructure Costs by Siting the SSC at INEL or Fermi Lab," November, 1987; and the RTK draft report, Gross Life Cycle Cost Analyses of BQL Sites, November, 1988. Table III compares the important findings.

TABLE III
Fermilab Cost Comparisons*

	SE	ILLINOIS PROPOSAL	KEARNEY REPORT	SIEMANN REPORT
Construction Cost Savings Injector	$225-293	$403	$426	-
Construction Cost Savings: Campus, Infrastructure	21	316** (tunnel) 144** (other infrastructure)	316** 144**	- -
Operating Cost Savings: Annual	46.6	62	88	-
Operating Cost Savings: Total	216-647 (5-15 yrs)	-	1,320	-
Start-up Cost Savings			113	
Financing Cost Savings			959	
Cost of Fermilab Modifications for SSC	-	-	-	$70-135

*cost in millions of 1986 dollars; Note: the Site Evaluation Report contained 1988 dollars; these figures have been converted to 1986 to make relevant comparisons.

** State of Illinois costs

It appears that USDOE grossly underestimated construction and operating cost savings. Assuming that the STF relied upon its contractor RTK's findings, application of those findings to the construction cost budget yields a much higher figure for construction cost savings. Using information from the Conceptual Design Report prepared by the SSC Central Design Group (March 1986), a calculated cost of building the injector complex with all of its attendant site and infrastructure needs totals $513 million (all costs in 1986 $). These are costs that need not be incurred at the Illinois site because of the existence of Fermilab. If the RTK costs (from the Siemann Report) of upgrading the Tevatron to make it suitable for the SSC are deducted from the overall avoided costs of the injector complex, the range of potential Cost Avoidance Net (CAN) is $378 million to $443 million. However, USDOE indicates potential CAN of only $246 million to $314 million in 1988 dollars. This $130 million difference is presently unexplainable. It is not clear if the STF life-cycle evaluations and computations are consistent with the USDOE's own figures in the Conceptual Design Report.

Furthermore, the Site Evaluation Report gives little explanation of how the annual operating cost savings of $46.6 million were calculated, only that it is for "such items as personnel, power, materials, supplies, and improvements." Considering Fermilab's current annual operating budget of approximately $200 million, the report's figure of less than one-fourth of these costs as realizable savings appears too low. Illinois estimated at least $62 million per year in operating cost savings, while the Kearney report figures $88 million annually. Although the Illinois Proposal gave greater detail and breakdown of these savings, USDOE does not. USDOE also gives a very broad range for total operating cost savings, based upon uncertainty in

the useful life of the Tevatron. The $216 million reflects an assumption of only five years of useful life after the SSC begins operations. Given USDOE's previous emphasis on maintaining the Tevatron with a viable research program, it seems unrealistic to assume such a short life span.

USDOE has stated that technical arguments in the Kearney Report supporting potential start-up cost savings from building the SSC at Fermilab are debatable. Since this deduction results in an "extent of benefits" that is "questionable," USDOE has not included such estimates in the SE. The Kearney report examined the advantages of using Fermilab's existing work force and computer software, and calculated benefits for reduced injector system downtime, all amounting to about $113 million in avoided start-up costs.

USDOE notes that it is "not normal practice to include financing costs in government project cost estimates." The Kearney report stated specifically, "costs associated with financing a government funded project are not normally considered in Congressional appropriation bills and hearings. However, it is essential that such real costs be considered as an impact on the level of the U.S. Government deficit." Since the U.S. Treasury must issue debt to finance the deficit, any reduction in the deficit will also reduce the amount of interest needed to pay off the debt instruments. The almost $1.0 billion savings is significant. USDOE chose, however, to disregard this claimed cost, while stating that if such costs were included, the LCC ranking would not change.

Finally, the tangible and immediate cost savings associated with building the SSC at Fermilab were, to a large extent, minimized and neutralized by only

calculating them into an overall life cycle cost of 25 years. The unavailability of the LCC equations and formulas to us makes it difficult to properly assess the findings with regard to cost. Projected cost estimates become increasingly less reliable the further into the future they are made, a fact also realized by USDOE. Thus, the immediate cost savings for the Illinois proposal were not viewed in any way as unique. Since 25 years in the future is a most uncertain perspective, the reality of the Fermilab cost advantage fades quickly. This is the most egregious error in the treatment of the value of Fermilab: the clear fact that major portions of the SSC do not need to be built in Illinois, thus saving taxpayers millions of dollars now, was undermined by trading off real savings with uncertain speculations about what costs will be in the future.

CONCLUSIONS

The Department of Energy developed and maintained in place a site selection process as part of the effort to solicit and evaluate possible sites for the proposed Superconducting Super Collider, planned as the world's foremost high-energy physics instrument. The participants in this process over the past two years have included many state and private proposers, some of which have expended extensive financial and human resources in competition for the site. These resources were dedicated because each proposer recognized the need for quality competition in a process that is designed to eliminate sites that may have some fatal environmental or design-related flaw. It is important, then, that the process itself not be fatally flawed and that the competition for the site is fair and reasonable for all the participants. The passage of the Domenici Amendment is one example of the United States Congress' concern for an equitable process. The process followed by the

National Academies of Science and Engineering and that led to the best qualified list continued to bolster the site selection process in the spirit it was designed.

With the publication and release of the DEIS, however, the process, in the opinion of the writers of this report, takes a decidedly different turn. The statement, published in August 1988 is, after all, a "draft." It is fraught with errors of omission and inaccuracy. The problem is not, of course, with the errors of the document, the problem is with what was done to correct the errors and use the corrections for the final evaluation process, a process apparently flawed in terms of scientific credibility and fairness.

Specifically, we find that the Department of Energy's Site Task Force:

- Assigned ratings prior to the reception and assimilation of corrections to information used to establish those ratings.
- Failed to perpetuate the site selection process established for the determination of a BQL.
- Applied subjective, vague and non-comparative methods for evaluating and selecting the preferred site.
- Demonstrated a pervasive inconsistency within its own documents and within and between site-specific evaluations.
- Assigned technical evaluation responsibility to individuals without proper technical expertise.
- Ignored responsible and responsive suggestions for mitigation of adverse impacts by the SSC.
- Adopted a policy biased toward a new site rather than an upgraded existing site and, in so doing, failed to educate its members on world-wide experience with high-energy instruments located in urban areas.

- o Refused to accept significant potential savings to the taxpayers by locating the SSC at Fermilab.

Certainly Illinois is disappointed by the selection of another site as the preferred site. However, it is the overall lack of consistency in the Site Evaluation report and the degrading of the site selection process that demands further scrutiny. The failure of the process at a critical time in the selection of the SSC was clearly detrimental to the goal of providing a sound environmental, geological and economical base for the "crown jewel of high energy physics."

0003tm

[The complete statement of the Honorable Terry L. Bruce follows:]

OPENING STATEMENT

THE HONORABLE TERRY L. BRUCE

SCIENCE, SPACE AND TECHNOLOGY HEARING

APRIL 5, 1989

THANK YOU MR. CHAIRMAN. LET ME SAY TO BEGIN WITH THAT I APPRECIATE YOUR EFFORTS, MR. CHAIRMAN, AND THE INTEREST OF THE ENTIRE COMMITTE IN THIS HEARING ON THE SSC SITE SELECTION PROCESS. WHILE MY HOME STATE OF ILLINOIS WAS NOT CHOSEN FOR THE SSC, I REMAIN HIGHLY SUPPORTIVE OF MAINTAINING OUR NATION'S POSITION AS A LEADER IN HIGH ENERGY PHYSICS.

But IN PROVIDING A SOUND ECONOMICAL, GEOLOGICAL AND ENVIRONMENTAL LOCATION FROM WHICH TO BEGIN CONSTRUCTION, THE DEPARTMENT OF ENERGY CONDUCTED LENGTHY STUDIES INTO THE MERITS OF EACH SITE'S PROPOSAL. HOWEVER, I BELIEVE THE WORK OF THE TASK FORCE WAS CRUCIALLY FLAWED IN MANY AREAS. THE GOVERNOR OF ILLINOIS IN RESPONSE TO THESE CONCERNS, HAS ASKED ME TO SUBMIT FOR THE COMMITTEE RECORD A REPORT REVIEWING THE PROBLEMS IN THE SITE SELECTION PROCESS. THIS REPORT CLEARLY IDENTIFIES DISTURBING INCONSISTENCIES IN THE DEPARTMENT OF ENERGY'S SSC SITE EVALUATION.

AMONG THE HIGHEST OF MY CONCERNS THAT THE REPORT GOES INTO FURTHER DETAIL ON IS THAT IN THE ILLINOIS DEBRIEFING CONDUCTED BY THE DEPARTMENT IT WAS REVEALED THAT THE RATINGS OF SIX TECHNICAL CRITERIA UPON WHICH THE DECISION TO SITE THE SSC WAS BASED WERE MADE AS EARLY

AS SEPTEMBER 18, 1988. THIS SUGGESTS THAT THE SSC SITE DECISION WAS BASED ON EARLY, INCOMPLETE AND INACCURATE INFORMATION, SINCE STATES' CORRECTIONS TO THE DRAFT ENVIRONMENTAL IMPACT STATEMENT - WHICH BY THE WAY WAS MAILED TO EVERYONE ON DOE'S LISTS AT A COST OF OVER $1 MILLION - HAD NOT YET BEEN DELIVERED TO THE DEPARTMENT.

OTHER AREAS THE REPORT INCLUDE DISCOMFORTING INFORMATION ON THE TECHNICAL EXPERTISE OF THE INDIVIDUALS CONDUCTING EVALUATIONS FOR WHICH THEY DID NOT HAVE THE REQUIRED QUALIFICATIONS, THE APPLICATION OF SUBJECTIVE, VAGUE AND NON-COMPARATIVE METHODS FOR EVALUATING AND SELECTING THE PREFERRED SITE, AND THE DEMOSTRATED PERVASIVE INCONSISTENCIES WITHIN DOE'S OWN DOCUMENTS AND WITHIN AND BETWEEN SITE-SPECIFIC EVALUATIONS.

THESE INCONSISTENCIES AND CONCERNS WITH DOE'S SITE EVALUATIONS MUST BE ~~CAREFULLY~~ REVIEWED BEFORE A PROJECT OF THIS MAGNITUDE IS FUNDED AT A TIME OF FISCAL CONSTRAINTS. I LOOK FORWARD TO THE TESTIMONY OF OUR WITNESSES IN ORDER TO GAIN A BETTER UNDERSTANDING OF THESE DECISIONS REVIEWING COMPLETELY THE SITE SELECTION PROCESS.

THANK YOU, MR. CHAIRMAN.

Chairman ROE. The Chair would ask, on behalf of our distinguished ranking member, unanimous consent that Mr. Walker's opening statement be placed in the record immediately following the Chairman's opening statement.

Without objection, so ordered.

The Chair now recognizes the distinguished gentleman from Michigan, the Honorable Paul Henry.

Mr. HENRY. First of all, I would like to be associated with the remarks of the gentleman from Hlinois, if I may. Secondly, let me just give very short opening remarks, which are very analogous in terms of the experience that the State of Michigan had in keeping with really, quite frankly what happened in the State of Illinois.

I will make simply two points relative to the selection siting process. The Department of Energy SSC task force completed its site assessment work and decided on Texas between September 18 and 25, one day before the Michigan environmental public hearing was even held with their officials, and 22 days before the deadline for the final submission of data to the Department of Energy.

The criteria which was most heavily ranked relative to the siting was the geology criteria. In the geology criteria, the commission received only a satisfactory rating. They told the state, on data submitted to DOE, that they deserved a much higher ranking. The question was on permeability data submitted by the state.

I think the process employed is a very, very hard one. The DOE evaluation points out what they believe is a major geological weakness for the site, in that the permeability ranges were quite large, according to their analysis.

Michigan had gathered approximately 20 geological borings with this information, and had not come up with findings anywhere near the same. In fact, their conclusions were very good. As a result, they questioned the DOE as to whether or not there was a need for additional borings in this regard.

At that time, the DOE official stated that there was no such need. At the debriefing, however, DOE officials pointed out that they suspected the possibility of greater permeability for the Stockbridge site. Therefore, they went out and gathered additional borings of their own, and thus changed their own final permeability range figures, much more in keeping with those originally submitted by Michigan.

However, in the debriefing to Michigan officials, they noted that more borings would have eased their fears about Stockbridge's permeability potential, and that Texas had done 30 or 40 borings, noting that Michigan should have done so; even though Michigan agreed to do so, and was told not to do so by the task force screening committee.

Those are the kinds of questions, Mr. Chairman, which have really undermined the potential credibility of the site selection process. Thank you.

[The complete joint statement of the Honorable Howard Wolpe and the Honorable Paul Henry follows:]

JOINT OPENING STATEMENT

OF
THE HONORABLE PAUL HENRY
AND
THE HONORABLE HOWARD WOLPE

COMMITTEE ON SCIENCE, SPACE, AND TECHNOLOGY
HEARING ON REVIEW OF THE SUPERCONDUCTING SUPER COLLIDER
SITE SELECTION PROCESS

APRIL 5, 1989

While we have no major disagreements with the Subcommittee's recommendations in most respects, we have serious concerns relative to the funding recommendations of the Subcommittee in regard to the Superconducting Super Collider project.

We have on past occasions spoken to the importance of the Superconducting Super Collider project to advanced research in high-energy physics, both nationally and internationally. However, several considerations give us reason to seek continued explorations of unresolved questions in regard to the project which we believe merit further review before the Subcommittee can in good faith recommend proceeding with the project.

1. We note that the total project cost estimates have escalated dramatically since our last consideration of the issue. Given the fact that the Superconducting Super Collider project necessarily comes at the expense of our ability to fund many other scientific projects, the "weighing" of the merits of this singular project in relation to many more projects which are now potentially adversely affected must be put in the balance of new scales.

2. Substantive questions remain unanswered as to the procedures employed in the site selection process utilized by the Department of Energy in determining the project's "preferred site". In hearings conducted by the Full Committee on April 5, testimony was submitted in regard to whether or not the site review process made its preliminary determination prior to receipt of data being submitted by applicant States to the DOE. While the National Academy of Sciences testified as to the appropriateness of the procedures being utilized in the site review process, it also testified that such a procedure would be self-evidently flawed if, in fact, the data base utilized was incomplete or inaccurate. As the later questions have not yet been fully resolved, it is therefore impossible to come to final conclusion as to the appropriateness of the site selection procedure.

3. In the hearing before the Full Committee on April 5, Rep. Wolpe raised questions pertaining to the geological expertise of the Department of Energy's site review panel, in addition to questions pertaining to the utilization of the full body of data submitted to the panel by various States. This hearing revealed that the National Academy of Sciences was explicitly prohibited by the DOE from rank-ordering the qualified sites -- even in terms of strictly scientific and technical factors, and that the subcommittee of the DOE's site selection committee concerned with determining the relative geological suitability of the alternative sites did not have a single geologist within its membership.

Neither Rep. Henry nor Rep. Wolpe wishes to prejudge the issue. But each believes that the magnitude of contemplated national expenditure, combined with unresolved questions of procedure and substance on the site selection process, demands further review before recommending authorization for continued work on the project. But each seeks to reserve the right to oppose the questions of the SSC in full committee and on the Floor, pending resolution of these questions.

Chairman ROE. I thank the gentleman from Michigan.

The Chair recognizes the distinguished gentleman from Colorado, Mr. Skaggs.

Mr. SKAGGS. Thank you very much, Mr. Chairman. I appreciate the Chairman's calling these hearings. I would like to request permission to submit a full opening statement for the record.

Chairman ROE. Without objection, so ordered.

[The complete statement of the Honorable David Skaggs follows:]

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WHIP AT LARGE

STATEMENT BY CONGRESSMAN DAVID SKAGGS
Committee on Science, Space and Technology

April 5, 1989

Mr. Chairman, I want to thank you for your leadership in holding this hearing to review the Superconducting Super Collider site selection process and related SSC issues.

Mr. Chairman, I'm extremely concerned about the fact that the Department spent $1.3 million to print and mail, first class postage, this 23-volume Environmental Impact Statement to 17,000 people -- people who for the most part didn't ask to be treated with such extravagance, people who didn't read it when they got it in the mail, people who, in Colorado at least, have asked me why we should bother to fund the SSC when the Department is so wasteful.

When I first heard of this terrible waste back in December, I immediately wrote to then Energy Secretary John Herrington about it. Three days later, I read in the news that he admitted very candidly that it was a terrible mistake, and he said, quote,

> "We didn't do the right thing on this, and the people involved feel badly about it. They had good intentions. And I think they're going to be a little wiser next time.
>
> "Number one, the environmental impact report dealt with seven sites instead of one, and it was huge. It would have been, I have to say, much better to send a card out to everybody and say 'We have the report available. Would you like a copy? You just check here and send it back.'"

I appreciated the Secretary's candor on this and assumed I'd receive a reply to my letter that would outline what the Department would do to prevent this kind of waste in the future.

But that didn't happen. Instead, I got a letter from Dr. Robert Hunter, one of the Department's Office Directors, saying that the only error DOE made was that it didn't avoid duplications in its mailing list.

That is unacceptable. I don't know if President Bush has heard about this from Lubbock, Texas, but folks in Limon, Colorado have let me know. This kind of action unnecessarily raises all sorts of questions about the Department's credibility in taking on a project of this sort. It also hurts the efforts of those of us in Congress who support the SSC, who took a leading role in the fight for the project last year, and who scrambled last year to get $100 million in start up funding for it.

I've brought with me to the hearing today a full 23-volume set of the 8,000 page, 25-pound environmental impact statement, so that people who didn't get a set in the mail can appreciate just how wasteful this was. I didn't get this set in the mail. I went and got it at the library, and that's where most Americans would have been glad to find it.

Our government is constituted to serve the people, but it can't afford to serve them breakfast in bed. The Department was right in wanting to make a strong effort to respond to people's comments and make sure everyone who wanted to read this document could. But that's why we have libraries, county and state and city offices. The regulations on this are flexible enough to have allowed the Department to notify people, by postcard, that they could have the 23 volumes if they really wanted them, or a much shorter summary if they wanted it, or nothing at all. The regulations also would have allowed the Department to take steps to shorten and condense part of the document. This was a judgment call, and I'm sorry to say, judgment was lacking.

If the SSC project is going to get credible backing in Congress, it can't afford to defend mistakes like this. I'm not here today to ask for apologies or explanations. But what I do expect, and what Congress needs to have confidence in the credibility in the management of this project, is a clear description of what the Department is doing to prevent this in the future. This is not the Department's last ever EIS. We need to know that this kind of million-dollar waste won't happen again.

Thank you very much Mr. Chairman for the opportunity to bring up this important issue.

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The Limon Leader

Thursday, December 22, 1988 3

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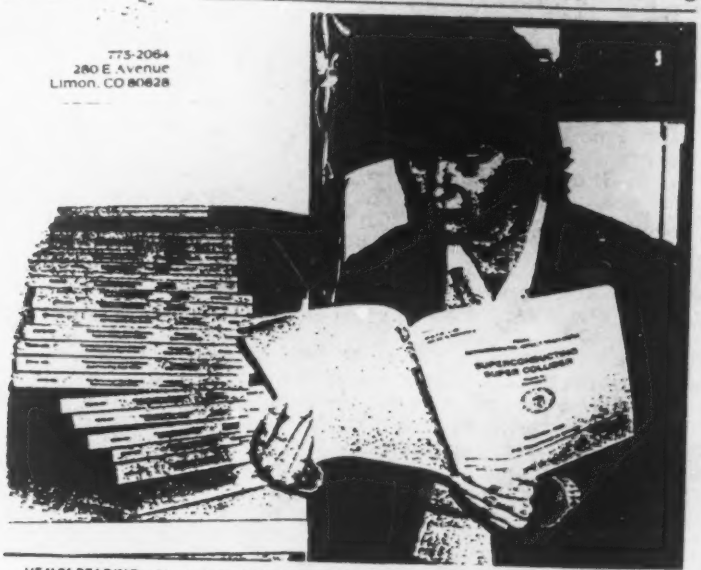

HEAVY READING—*Limon Leader* staff writer Su Wright tried some new reading material on for size this week, but decided it will have to wait for vacation. *The Leader*, like some 17,000 other "interested parties," received unsolicited copies of the final environmental impact statement for the proposed Superconducting Super Collider project, a huge, high-energy physics laboratory that will be built in Texas. Colorado had a site in the running for the SSC, and the pros and cons of that site are included in the volumes shown here. Each 25,000-page set cost $17.60 to mail first-class, and with printing included, distribution of the documents cost the federal government $1.3 million, according to an article in Monday's *Denver Post*. The information will be maintained for a while at *The Leader* office for review by any interested party.

Mr. SKAGGS. As well as asking that there be included in the record a letter dated March 30 from the Governor of Colorado, Roy Romer, to Mr. Simon of our staff.

[The letter follows:]

STATE OF COLORADO

EXECUTIVE CHAMBERS
136 State Capitol
Denver, Colorado 80203-1792
Phone (303) 866-2471

Roy Romer
Governor
Stewart A. Bliss
Chief of Staff

March 30, 1989

Mr. Greg Simon
Staff Director/Counsel
Investigations and Oversight Subcommittee
B 374 Rayburn HOB
Washington, DC 20515

Dear Mr. Simon:

Thank you for the invitation to testify at the April 5, 1989 hearing before the House Committee on Science, Space and Technology. The purpose of the hearing, as I understand it, is to receive comments on the fairness of the Superconducting Super Collider (SSC) site selection process from Governors representing the seven state finalists.

I regret that I am unable to appear at the April 5 hearing. Please consider this letter to constitute my testimony and convey it to the Honorable Robert A. Roe, Committee Chairman, for inclusion in the hearing record.

The SSC site selection process was fair and equitable in concept. Department of Energy (DOE) officials explained the process and the site selection criteria carefully. The Department also seemed to have built in appropriate safeguards to ensure that siting decisions would be based on the selection criteria and not on other factors. Colorado had an excellent relationship with Department of Energy officials and contractors throughout the site evaluation process. We had ample opportunity to submit information, clarify Department needs, supplement our earlier submittals and discuss issues of mutual interest.

Not being privy to the deliberations of the SSC Site Task Force, I cannot comment substantively on how well the site selection process worked in practice. I have no basis to question the fairness of these deliberations or dispute the wisdom of the Task Force in finally selecting the Texas site.

Our one concern relates to the Department's own explanation of its site selection process. On December 5, 1988, representatives of the Department of Energy and Site Task Force debriefed a Colorado delegation on the site evaluation and selection process. Tim Schultz, Executive Director of the Colorado Department of Local Affairs and the state's SSC Project Director, led our delegation.

We were not entirely satisfied with the debriefing. The responses to some of our questions and concerns were vague. We left the meeting uncertain as to whether this reflected on the site selection process itself or on the preparation of the DOE representatives at the debriefing. We were subsequently told by Department officials that the lack of sufficient preparation, and not the process, was at fault. Colorado was, in fact, the first state to be debriefed.

Site geology and real estate acquisition were the two issues inadequately addressed at the debriefing. We raised numerous questions about the rating of our site geology below that of Texas and Illinois. The Department's responses failed to identify the specific differences in site geology that resulted in the ratings. They also failed to dispel our concern that the criteria may have been applied inconsistently.

Colorado's lack of a real estate acquisition plan resulted in a surprisingly low rating, despite our minimal relocation needs. We disagreed that Colorado needed the same kind of plan to relocate six residences that other states needed for hundreds of relocations. Again, the Department's responses at the debriefing left us with doubts about how well the site rating process had worked.

Apparently in response to our frustration at the lack of specificity during the debriefing, DOE officials increased their preparation for later sessions. Our limited knowledge of these subsequent debriefings leads us to conclude that inadequate preparation had indeed been the problem on December 5.

In sum, the Department of Energy undertook a very complex technical and political challenge. Although I am disappointed that Colorado was not selected as the host state for the SSC, I have no proof to suggest that the site selection process was flawed in design or implementation.

Please feel free to call on Tim Schultz at 303-866-2419 if you have questions or desire further information.

Sincerely,

Roy Romer
Governor

Chairman ROE. Without objection, so ordered.

Mr. SKAGGS. In very brief comments, Mr. Chairman, I would like to quote one sentence from that letter from the governor, which is, "I have no basis to question the fairness of these deliberations, or dispute the wisdom of the task force in finally selecting the Texas site." I appreciate being able to represent those views on behalf of my state, which was on the best qualified list.

One thing I do wish to get into later on in our discussion with the witnesses is the decision that was made by the Department to send, at a cost of nearly a million-and-a-half dollars, a full environmental impact statement [EIS] on the site selection process to some 17,000 people. Mr. Chairman, this is the EIS. I got it from the library, which is where I think the vast majority of people who might be interested in it could have obtained it. And while certainly it is the purpose of government to serve the people, we do not need to serve them breakfast in bed.

I hope we can get further into the question of the judgment that was exercised in spending a good deal of money on this mailing, when we need to husband these resources for purposes of building this project. Thank you, Mr. Chairman.

Chairman ROE. I thank the distinguished gentleman from Colorado.

The Chair recognizes the distinguished gentleman from Illinois, Mr. Fawell.

Mr. FAWELL. Thank you, Mr. Chairman. I would ask unanimous consent to submit a statement in writing.

Chairman ROE. You are asking unanimous consent? Without objection, so ordered.

[Mr. Fawell chose not to submit a written statement.]

Mr. FAWELL. May I add that I join with my colleague from Illinois in the presentation of the report of the Department of Energy and Natural Resources. I agree wholly with the Chairman's statement, that the issue here is a question of fairness.

I would submit that probably anything on earth could meet the definition of fairness in such a gigantic task as is before the Department of Energy. I guess the question is really whether or not some miscalculations are so egregious as to shake even the political conscience and processes of Congress.

I think there were some areas in each state, as one looks at their own proposals, that it has shaken up a bit. I certainly have been in that category, but I want to approach it with as open a mind as possible. I do not believe that anyone would say, nor would I say, that we are not dedicated to having the SSC in this country of ours. It is something that we do need.

It is good, I think, for us to sit down and look at the process, and maybe be able to learn something about how matters like this in the future should be conducted. I thank you.

Chairman ROE. I think the gentleman adds an important dimension to our discussion today.

The Chair recognizes the distinguished gentleman from Michigan, Mr. Wolpe.

Mr. WOLPE. Thank you very much, Mr. Chairman. First, I wanted to express my appreciation to you for holding this hearing

and permitting an opportunity to score the integrity of the process that was involved in site selection.

I also want to associate myself with the remarks of my colleague from Michigan, Mr. Henry. The bottom line is, in the course of this process, the impression was conveyed that decisions had been made even as there was an ongoing request for information to be supplied by the competing states. That is obviously troubling, and I am hopeful that the hearing today will help reveal precisely what did happen in the course of that investigation and determination.

I would also note that my understanding is that the GAO, in its testimony today, will be responding essentially to several requests that have been made from this committee, from the Illinois delegation and Senator DeConcini. There was a fourth request submitted by members of the Michigan Congressional delegation to GAO. I understand that that report is not yet complete. So today certainly will not be the final answer to the questions that I think have been raised, but I think it is an important beginning, and I thank the Chair.

Chairman ROE. I thank the gentleman.

The Chair recognizes the distinguished gentleman from Texas, Mr. Hall.

Mr. HALL. Thank you, Mr. Chairman. I, too, want to thank the Chairman for this hearing and for his usual approach to problems that trouble this committee. I recognize all of my colleagues as men and women who are fair, and usually have a legitimate complaint. I guess I would rather be defending the state that is selected than questioning the fairness of those that made the decision.

If there are concerns, this is the platform where we would work them out. I think every member should be accorded every courtesy in the fullness of their complaint. I think the Department of Energy, that made the selection, and those in the selection process, should be accorded the same right to answer. They went through a long process.

While I am parochial, in that I am very pleased that Texas was selected, I would have been more pleased if they had selected a little further east and northeast in Texas, over in the Fourth Congressional District.

I am parochial enough for the State of Texas, but also parochial enough for the United States of America to have this project. It is a must, I think. I certainly am pleased with the fact that we get the right to air the issues that are here.

Interest in fairness is not delegated to those of us who were selected. We want to be fair, and want to accord everyone any question that they have and that they might want to answer. Sometimes, I wince when I hear them say Texas, because I guess I am a little sensitive about the state.

I know a story, Mr. Chairman, about a woman who had a sensitive son. When she sent him to first grade, she sent a note with him that said, "Orville is a very sensitive boy. If he does anything wrong, don't punish Orville, slap the boy next to him. That'll frighten Orville." [Laughter.]

I feel like when you are slapping the Department of Energy here, that you are hitting the State of Texas, because they made that decision. I have read most of their background and, frankly, I think

they will have an answer to the many legitimate questions of those of you who represent states other than the state selected. Thank you, Mr. Chairman.

Chairman ROE. I regret that Orville is not going to be a witness today. [Laughter.]

Are there any other opening statements?

[No response.]

Chairman ROE. If not, the Chair will recognize the first distinguished witness, Dr. Raphael G. Kasper, project director of the Super Collider Site Evaluation Committee of the National Academies of Science and Engineering.

Dr. Kasper, I welcome you this morning to join with us and give your views and observations on the process. That is what we are interested in. I think Mr. Fawell makes a very important point here. It is not just the purpose of our beginning oversight hearings to relate to the process, but also to establish the dimensions of future programs and processes that the Committee and the Congress would feel comfortable with. I think that is important to say at this point in the record.

Therefore, the Chair recognizes the distinguished gentleman from the National Academies.

STATEMENT OF DR. RAPHAEL G. KASPER, PROJECT DIRECTOR, SUPER COLLIDER SITE EVALUATION COMMITTEE OF THE NATIONAL ACADEMIES OF SCIENCE AND ENGINEERING

Dr. KASPER. Mr. Chairman, thank you for the opportunity to discuss the role of the National Academies of Science and Engineering in the site selection process for the Superconducting Super Collider. I served as project director for the Academies' Super Collider Site Evaluation Committee, which was asked by the Department of Energy to review site proposals and to recommend a best qualified list of sites.

Almost exactly a year ago, Frank Press, the President of the National Academy of Sciences, and Bob White, the President of the National Academy of Engineering, and I, testified at a hearing of this committee that was considering the preparation of the best qualified list.

In the year since our testimony, the Department of Energy has selected the Ellis County, Texas, site as the location for the SSC. I want to note that the Academies were not asked to participate in the process of selecting a single site from among the best qualified sites, and they did not take part in that process.

Chairman ROE. Why don't you elucidate for the record at that point the charge of the Academies, specifically?

Dr. KASPER. I will come to that in just a moment.

Chairman ROE. I think it is important to hear it now.

Dr. KASPER. The Academies were asked to review the 35 proposals that met the qualification criteria of the Department of Energy, and to present to the Department a suggested list of best qualified sites, an unranked list of undetermined, but a small number.

What I will describe in a moment is the process by which the Academies did that.

Chairman ROE. Okay, continue.

Dr. KASPER. Also in the intervening year, the United States General Accounting Office reviewed the fairness of the process for determining the best qualified sites, and issued a report called "Determination of the Best Qualified Sites for DOE's Super Collider."

The GAO examined documents and interviewed a number of individuals, including every member of the Academies' site selection committee. They concluded, and I quote, "The committee used Energy's site selection criteria in their order of importance and the process was fair."

Dr. Press, Dr. White, and I did discuss the process by which the Academies conducted their part of the site selection process with officials of every state that requested such a discussion. As might have been anticipated, this was not always an easy or pleasant task.

Any process that chooses among a number of competitors must, by its very nature, disappoint some of the parties. The extent of that disappointment is probably made even greater in this case because of the very large stakes involved—to science, to local and regional economies, and to state and national status and prestige.

Our task was made all the more difficult by virtue of the remarkably high quality of almost all of the proposals reviewed, and the evident dedication and commitment of those who prepared them.

So that, by the time we testified last year, the Academies' role was essentially completed. I want to review, though, the way that the Academies went about their business and came up with a best qualified list of sites.

When the Academies were asked to provide assistance to DOE, it was recognized right from the start that the process in which they were becoming involved was quite sensitive. So, the presidents of the Academies set out to establish a committee of considerable expertise and wisdom, and most important, one that had no direct stake in the final decision about the location of the facility. I believe we assembled a committee that met those criteria: Twenty-one distinguished individuals, specialists in high energy physics, engineering, geology, accelerator design, economics, procurement, the environment, heavy construction, and large-facility management.

The chairman of the committee was Dr. Edward Frieman, Director of the Scripps Institute of Oceanography. The committee included two Nobel Prize winners, directors of several major scientific institutions, the chief of the Army Corps of Engineers, the Secretary of the Smithsonian Institution, the former chief executive officer of Du Pont, and the president and two vice presidents of major research universities, among them.

I should point out that the members of the committee were not chosen to represent or advocate their home states, and they did not do so. I am convinced that they approached their task seriously and fairly.

The GAO report concurs. It notes, "We did not find any evidence of favoritism by committee members in evaluation proposals or identifying the best qualified sites based on the members' geographical representation."

Of 43 proposals received by the Department of Energy in September 1987, 36 were formally transmitted to the Academies for review. During our evaluation process, one proposal was withdrawn from consideration by the State of New York.

Our committee was asked to evaluate the proposals and to identify a small number of best qualified sites from among those considered. The committee completed its work in just over three months, and prepared a report called "Siting the Superconducting Super Collider," * that explained its process, presented the best qualified list, and discussed the characteristics of the sites that were on that best qualified list. I have provided the committee with copies of the report for the hearing record.

The Academies' committee was to evaluate only the information in the proposals and in cost estimates provided by the Department of Energy. Additional information in the form of, say, site visits was not to influence the decisions of the committee.

Proposers were made aware of this constraint very early in the process. They were to present all information they wished reviewed in their proposals.

The DOE's invitation for site proposals listed six criteria and 19 sub-criteria that would be used in the evaluation process. The Department also announced the order of importance of the criteria. The committee faithfully adhered to the list, and adhered to the GAO assessment that provides an independent verification.[1]

In order to facilitate its work, the committee established working groups that focused on each of the six major criteria, and one on costs. Each working group was composed of those members of the committee with particular expertise in its area of focus. The report itself describes how the committee interpreted the criteria announced in the invitation for site proposals. I will not repeat that discussion here, but I do want to indicate some noteworthy aspects of the criteria and the proposals.

The most important criterion was geology: suitability for construction and operation, stability, minimal risks encountered in construction and operation.

In general, the proposals were quite good in this area. Although only a handful of the sites presented what appeared to be overwhelming geological problems, there were significant geological differences among the sites, and some sites had geological characteristics better suited to the SSC than others.

Regional resources, the next criterion in order of importance, included a broad range of characteristics of the sites. The committee noted in its report that the components of regional resources "are less amenable to detailed technical analysis than are geological conditions."

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* *Siting the Superconducting Super Collider,* Report by the Super Collider Site Evaluation Committee of the National Academy of Sciences and the National Academy of Engineering (Washington: National Academy Press, 1988). Dr. Kasper submitted the full report with his prepared statement and it is retained in Committee files. Copies may be available from the National Academy Press.

[1] Dr. Kasper amended this sentence to read: "The committee faithfully adhered to the list, and the GAO assessment provides an independent verification."

Then, the report continues:

> The committee was faced with the question of identifying which regional resources are most important to the efficient and effective construction, start-up, and operation of a major scientific facility and laboratory. The criteria and sub-criteria listed by DOE in the invitation for site proposals are in general comprehensive; but they provide little guidance as to which components would be most important to the eventual success of the SSC.

There was however, the committee found, much experience in the United States in running large facilities. The committee sought out some of that experience, and found it helpful in its deliberations.[2]

The environmental impacts of construction and operation were also considered. Here, the committee concluded, and I quote again, that "no site proposal presented environmental problems that could not be prevented or minimized;" but because the sites proposed displayed such disparate environmental conditions, it is not surprising that there were considerable differences in the impacts that could be expected.

Three other technical criteria were evaluated. Although the 35 sites differed in the extent and manner in which they met these criteria, there were no major negative or disqualifying criteria at any of the sites with regard to setting, regional conditions or utilities.

The Invitation for Site Proposals [3] indicated quite clearly that costs were to be considered as important, but not primary factors in the evaluation of sites. The DOE, working with a contractor, calculated life cycle costs for each site, and provided the results of the calculations to our committee.

Determining precisely what is meant by "important but not primary" might have created significant difficulties for the committee, were it not for, and I quote from the committee report:

> . . . the remarkably narrow range within which cost estimates for the different sites fell. The cost of the most expensive sites was only a few percent above the average for the group, and that of the most economical site was only a few percent below the average. Since the range of uncertainty was no doubt at least comparable in magnitude, this obviously weakened considerably the committee's ability to distinguish among the site proposals in terms of the costs that each could be expected to entail.

In the end, the best qualified list represents the best collective judgment of 21 individuals carefully chosen for their broad and varied expertise, experience, and perspective.

The committee did note in its report that a productive and effective SSC could be built and operated at any of the sites that appeared on the best qualified list.

Mr. Chairman, this completes my prepared remarks. I will be happy to answer any questions you may have.

[The prepared statement of Dr. Kasper follows:]

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[2] The regional resources subcommittee of the Academies' Committee met with five scientists familiar with the management of large research facilities on August 31, 1987.

[3] "The Invitation For Site Proposals for the Superconducting Super Collider," Office of Energy Research, U.S. Department of Energy (DOE/ER-0315), April 1987.

Statement by

Dr. Raphael G. Kasper

before the

Committee on Science, Space, and Technology

of the

House of Representatives

Wednesday, April 5, 1989 - 10:00 am

Room 2318 Rayburn House Office Building

Mr. Chairman, thank you for the opportunity to discuss the role of the National Academies of Sciences and Engineering in the site selection process for the Superconducting Super Collider. I served as Project Director for the Academies' Super Collider Site Evaluation Committee which was asked by the Department of Energy to review site proposals and recommend a Best Qualified List.

Almost exactly one year ago, Dr. Frank Press, President of the National Academy of Sciences, Dr. Robert M. White, President of the National Academy of Engineering, and I testified at a hearing of this Committee considering the preparation of the best qualified list of sites for the SSC. In the year since our testimony, the Department of Energy has selected the Ellis County, Texas site as the location for the SSC. The Academies were not asked to participate in the process of selecting a single site from among the best qualified sites, and they did not.

Also in the intervening year, the United States General Accounting Office reviewed the fairness of the process for determining the best qualified sites and issued a report: **Determination of the Best Qualified Sites for DOE's Super Collider.** The GAO examined documents and interviewed a number of individuals including every member of the Academies' Site Selection Committee and concluded "the committee used Energy's site selection criteria in their order of importance and that the process was fair."

Dr. Press, Dr. White, and I did discuss the process by which the Academies conducted their part of the site selection process with officials of every state that requested such a discussion. As might have been anticipated, this was not always an easy or pleasant task. Any process that chooses among a number of competitors must, by its very nature, disappoint some of the parties. The extent of that disappointment is probably made even greater in this case because of the very large stakes involved -- to science, to local and regional economies, and to state and national status and prestige. Our task was made all the more difficult by virtue of the remarkably high quality of almost all of the proposals and the evident dedication and commitment of those who prepared them.

By the time we testified last year the Academies' role was essentially completed. Let me now review for you the way in which the Academies went about their business.

Shortly after President Reagan announced his administration's intention to build the SSC in January 1987, the Department of Energy formally requested assistance from the Academies in identifying the best qualified sites from among those that would be proposed. Although the Academies exist, in part, for the purpose of providing advice to the government, agency requests for assistance in site selection or procurement activities are rare, but not unprecedented. In 1965, for

instance, the Atomic Energy Commission asked the National Academy of Sciences to provide its judgment about which of a large number of proposed sites would be best qualified as the location of the 200-BeV accelerator laboratory now known as Fermilab.

The Presidents of the Academies recognized at the outset, of course, the sensitivity of the process in which they were becoming involved and set out to establish a committee of great expertise and wisdom -- and one that would have no direct stake in the final decision about the location of the facility. I believe that they assembled a committee that met these criteria -- 21 distinguished individuals including specialists in high energy physics, engineering geology, accelerator design, economics, procurement, the environment, heavy construction, and large-facility management. The chairman was Dr. Edward Frieman, Director of the Scripps Institution of Oceanography. The committee included two Nobel Prize winners, the directors of several major scientific institutions, the chief of the Army Corps of Engineers, the Secretary of the Smithsonian Institution, the former chief executive officer of Du Pont, and the president and two vice presidents of major research universities, among others.

As with all committees at the Academies, this one served without compensation; the members were volunteers, all of whom had full-time positions elsewhere with demanding responsibilities.

I should point out that members of the committee were not chosen to represent or advocate their home states--and they did not do so. I am convinced that they approached their tasks seriously and fairly. The GAO report concurs and notes: "We did not find any evidence of favoritism by committee members in evaluation proposals or identifying the best qualified sites based on the member's geographical representation."

Of the 43 proposals received by the Department of Energy in September, 1987, 36 were formally transmitted to the Academies for review. (During the evaluation process, one proposal was withdrawn from consideration by New York.) Our committee was asked to evaluate the proposals and to identify "a small number of best qualified sites from among those considered." The committee completed its work in just over three months and prepared a report (**Siting the Superconducting Super Collider**) that explained its process, presented the best qualified list, and discussed the characteristics of the sites on that list. (I have provided the Committee with copies of the report for the hearing record.)

It is worth mentioning some aspects of the charge to the Academies that affected the manner in which the committee approached its task. The Department of Energy asked us to complete the review process in three months. There was, of course, an enormous amount of material that had to be read,

digested, and evaluated. The members of the committee devoted a substantial portion of their time to the review process, perhaps more than one should expect from a group serving voluntarily and with the demands of their full-time positions continuing unabated during this period, and we met the schedule.

The committee was asked to provide an "unranked" list of the best qualified sites. This was one of several factors that precluded the use of detailed numerical schemes in the evaluation, for these would have led, inevitably, to a ranking of the sites.

The committee was to evaluate only the information in the proposals and in cost estimates provided by the Department of Energy; additional information in the form of, say, site visits was not to influence the decisions of the committee. Proposers were made aware of this constraint very early in the process; they were to present all information they wished reviewed in the proposals.

The most significant guidance and constraint under which the committee worked lay in the fact that DOE announced, in its Invitation for Site Proposals, the six criteria and 19 subcriteria that would be used in the evaluation process--and the Department also announced the order of importance of the criteria. Again, fairness demanded that there be no change in the criteria or their order of importance, and the committee

faithfully adhered to both. Here, too, the GAO assessment provides an independent verification.

The Academies were asked by DOE to treat the proposals as "confidential", presumably because the evaluation process was part of an ongoing procurement, or procurement-like, process. We have tried to be conscientious about the way in which we have portrayed the proposals in public. With the exception of the required discussion of characteristics of the sites on the best qualified list that appears in the report, we have tried not to make statements about details of the proposals or to characterize strengths and weaknesses of competing proposals. As I noted earlier, we have discussed with principals involved in individual proposals the characteristics of their sites, but we have done so without providing detailed comparisons with other sites.

Before it received any proposals for review, the committee recognized that it was faced with the task of evaluating the proposals using a multiplicity of technical criteria, subcriteria, and costs. Because of the difficulty--some on the committee would have said impossibility--of directly comparing the various criteria and the extent to which individual proposals met or did not meet the criteria, "the committee decided against adopting a rigid set of weights that would allow a mechanical means of scoring or grading proposals." The committee was mindful of the fact that using any other method would highlight "subjective" elements in the process, but is felt first, that the

process, by necessity, involved matters of judgment and that it was proper to acknowledge this at the outset, and second, that the use of numbers to garde the criteria introduced only a spurious impression of objectivity and accuracy while entailing every bit as much subjective judgment as any other technique. It was decided, therefore, to evaluate the proposals with respect to any given criterion using the values "good", "satisfactory", and "questionable".

In order to facilitate its work, the committee established working groups to focus on each of the sic major criteria, and on costs. Each working group was composed of these members of the committee with particular expertise in its are of focus. The working groups were asked to identify strengths and weaknesses of all the proposals in their particular area of concern to form a basis for discussion by the full committee and to provide an initial evaluation of the proposals as an input to the deliberations of the committee.

The report describes how the committee interpreted the criteria announced in the **Invitation for Site Proposals**; I will not repeat that discussion here, but I will indicate some noteworthy aspects of the criteria and the proposals.

The most important criterion was "geology"--suitability for construction and operation, stability, minimal risks encountered in construction and operation. In general, the proposals were

quite good in this area, but although only a handful of the sites presented what appeared to be overwhelming geological problems, here were significant geological distinctions among the sites, and some sites had geological characteristics better suited to the SSC than others.

"Regional resources", the next criterion in order of importance, included a broad range of characteristics of the sites; the committee noted in its report that the components of regional resources "are less amenable to detailed technical analysis than are geological conditions." The report continues:

> The committee was faced with the question of identifying which regional resources are most important to the efficient and effective construction, start-up, andoperation of a major scientific facility and laboratory.The criteria and subcriteria listed by DOE in the ISP are,in general, comprehensive, but they provide little guidanceas to which components will be most important to the eventual success of the SSC.

To get a better handle on the issue, the working group on regional resources convened a meeting with directors and representatives of a number of large scientific laboratories to discuss those aspects of community and regional resources that are, in fact, most important in the actual operation of their laboratories--as opposed to those that unexamined, conventional

wisdom might highlight. There is much experience in the United States with running large facilities and that experience was quite helpful in fashioning the committee's views. The committee explains its conclusions on this matter in the report.

Environmental impacts of construction and operation were considered. The committee concluded that "no site proposal presented environmental problems that could not be prevented or minimized," but because the sites proposed displayed such disparate environmental conditions, it is not surprising that there were considerable differences in the impacts that could be expected.

The committee sought help from experts in the Corps of Engineers in its examination of the strengths and deficiencies of the various plans for timely acquisition of the required land and found considerable differences among proposals. Some of the plans were quite complicated and involved acquisition of a large number of small plots; others were simple in comparison.

Regional conditions--natural and man-made conditions that could affect construction and operation of the SSC--were reviewed. Again, there were significant differences among the sites, although the committee concluded that "no site was characterized by such negative regional conditions that it could be eliminated on this basis alone. Thus, for example, at those

few sites that had potential noise and vibration problems, it was felt that effective remedial actions were possible."

The last of the technical evaluation criteria was "utilities", and it provided little discrimination among the sites; "all but one of the proposals demonstrated the ability to provide reliable and stable electric power, water, and fuel, and to handle the wastes generated...."

The Invitation for Site Proposals indicates clearly that costs were to be considered as important, but not primary factors in the evaluation of sites. The DOE, working with a contractor, calculated life cycle costs for each site and provided the results of the calculations to our committee. Determining precisely what is meant by "important, but not primary" might have created significant difficulties for the committee were it not for

> ... the remarkably narrow range within which cost estimates for the different sites fell. The cost of the most expensive sites was only a few percent above the average for the group, and that of the most economical site was only a few percent below the average. Since the range of uncertainty was no doubt at least comparable in magnitude, this obviously weakened considerably the committee's ability to distinguish among the site proposals in terms of the costs each could be expected to entail.

All of the 35 proposals can be said to have been qualified, at least in the sense of having met the Department of Energy's "Qualification Criteria." The committee was asked to select the "best" of these. As I have already noted, there were clear and distinct differences among the sites and the extent to which they met the criteria announced in the Invitation for Site Proposals. In generating the best qualified list, the committee discussed the characteristics of each of the proposals. After the discussion, the committee made an explicit determination of whether or not the site merited inclusion on the best qualified list. In each case the members of the committee agreed, without dissent, on that determination. The best qualified list represents the best collective judgment of 21 individuals, carefully chosen for their broad and varied expertise, experience, and perspective. The committee notes that "a productive and effective SSC could be built and operated at any of the sites on the list."

This completes my prepared remarks. I would be happy to answer any questions you may have.

Raphael G. Kasper

Dr. Raphael G. Kasper is Associate Director of the Superconducting Super Collider Laboratory, a position he assumed in March of 1989. For more than 15 years before that, Dr. Kasper served on the staff of the National Academy of Sciences, most recently in the position of Executive Director of the Commission on Physical Sciences, Mathematics, and Resources. Twice during his tenure at the Academy, Dr. Kasper took leaves to serve in the Executive Office of the President, once in 1977 as Senior Policy Analyst in the Office of Science and Technology Policy and once in 1980-81 as Director of Studies for the President's Nuclear Safety Oversight Committee.

Chairman ROE. Okay. We thank the distinguished gentleman for his presentation.

Now, the Chair would open the matter up for questions. Mr. Henry of Michigan.

Mr. HENRY. Thank you, Mr. Chairman. Thank you, Dr. Kasper. I do not think the issue here is just on the second process. That is not what we are here for, obviously. And you know, I believe this is a valid instrument and an important one.

The concern, if the Chairman will forgive me, is not with the integrity of the National Academies of Sciences, or the overview, but on the part of some of us as to whether or not the data was even in the hands of the Department of Energy's evaluating process.

In other words, the process may have been eminently fair in the descriptive criteria, and eminently fair in setting aside all the issues of whether political pressure was on or not, you know, even setting aside that; but for example, at the request of the Department of Energy—and I hate to be pleading in a special interest way—we have not gotten a response yet.

We have gone to the Comptroller General, we have gone to the Department of Energy. I am not sure that you are able to tell us—perhaps you are.

Michigan was asked to perform new rock borings on its geology. Those rock borings were critically important in terms of the range of the geology, as well as the environmental impact criteria. So, that is with respect to the major as well as the secondary criteria in February of 1988.

As a result, the draft environmental impact statement, at least in August, substantially upgraded Michigan's site geology. It appears, however, that this information was omitted from DOE's final November 1988 report entitled "SSC Site Evaluation."

Thus, the question is: What data was being used? We have yet to receive any explanation or assurance that the DOE actually considered and evaluated all the information submitted by the parties regarding SSC site proposals, including updated material produced in response to requests for more information by DOE.

We do not even know where the data was sent. In the case of Michigan, for example, was the material sent to RTK, which in fact was the contracting agency to DOE in the State of Michigan? Or, did it go straight to DOE? We have been waiting for several long, long months for answers to those questions.

But you see, the significance of it is not that the process may have been skewed or unfair, but that fundamental data which would significantly affect the evaluative procedures itself was not in place for the review.

I am wondering if you have been able to get information. I know that Chairman Riegle [4] has requested that information. To the best of my knowledge, he has not received a reply.

Dr. KASPER. I really think that question is more appropriately addressed to the witness from the Department of Energy. As I have indicated, the Academies completed its work at the end of December of 1987, and at that time the Academies had been charged with

[4] The Honorable Don Riegle, Senator from Michigan.

reviewing information that appeared in the proposals. That was what the Academies' committee had done.

Mr. HENRY. But the point is, it was not only overviewing the information, but overviewing the process; that it was scientifically appropriate and in keeping with the criteria that the Congress had established for the sites; because it presumes that, as you make that evaluation, the data which is being reviewed is the proper data. At least in our case, there is significant controversy as to whether or not the right set of data was even under review. Even having read the time frame in this instance was post your involvement.

But it would be correct that, if the basic input was wrong, the process could be imperfect. The outputs could be wrong with the wrong input being reviewed. Isn't that so?

Dr. KASPER. That is certainly true.

Mr. HENRY. Thank you. That is all I wanted to hear.

Chairman ROE. If the Chair may interject at this point, I think it is important to clarify a point as we go through this process. Where the Academies were involved, they in effect were involved at the point of the short list. That is precisely—and you explained that quite fully—what you have done.

I believe there were, what? Eight, and New York withdrew one. Michigan was one of the eight. Is that correct?

Dr. KASPER. That is correct.

Chairman ROE. Therefore, what I think we should try to concentrate on, and the one question the Chair would like to ask for clarity's sake, is, do you, as the executive director, and do the members of the site selection committee of the Academies, feel that they received all of the pertinent data that they would need to work with in the determination of the short list?

Dr. KASPER. I did discuss that with members of the committee in going through the process. I believe the committee felt that it had sufficient information in the proposals to prepare the best qualified list. In the report, the committee does indicate that, in the subsequent process, they might get more information that was necessary.

The committee was concerned, for instance, that there should be site visits. Our committee made no site visits. We felt reasonably comfortable with preparing a best qualified list without those site visits; but insisted in the report that the final determination of site could only be made after site visits and obtaining additional information in a few areas which the committee points out.

Chairman ROE. Let me ask you a specific question. You state that Dr. Press and Dr. White discussed the Academies' role in the site selection process with some of the disappointed competitors. Did any of those, to your knowledge, those state officials, raise concerns that would have made a significant impact in the site selection process or the short list, in your judgment?

Dr. KASPER. No, they did not.

Mr. HENRY. Mr. Chairman, just one brief comment. You see what is happening? We are talking in two stages of review; but in the case of Michigan, on the environmental issue—for example the whole wetlands issue—the Department of Energy has now admittedly corrected the figures that were used in the site review proc-

ess, saying in fact that the wrong figures were used; reducing, for example, an estimated 3,000 acres of wetland, including the whole site under water, to 190 wetland acres. It is a substantial change.

They tell us that had no impact. But we also have a much more fundamental issue of the geology, where our drillings were substantially different. That really becomes critical, because that is where the major impact was, and appropriately so. We have not been able to identify at what point the data got in the data base.

Chairman ROE. If the gentleman will yield, I understand the number. I think you are on the right track; but I think it is important to clarify the position of the Academies. That is what we are trying to do first.

From my understanding, the Academies did not rank, per se, the selection they made in the short list.

Dr. KASPER. We were explicitly asked not to rank the short list.

Chairman ROE. Therefore, for the information that was before the Academies at the time of the decision covering whatever—plus or minus, whatever it was—38 or whatever, at that point, they reviewed those particular issues and then presented a short list, without ranking them at that point.

Now, the next question that I think is important, if the gentleman will yield further, is, that was the end of the Academies' observations at that point?

Dr. KASPER. That is correct.

Chairman ROE. Then they were finished with their work.

Dr. KASPER. Except that we felt, and offered to discuss the process, with any state officials that wanted to discuss.

Chairman ROE. Did you discuss with state officials?

Dr. KASPER. With a number of states.

Chairman ROE. What were your observations from the number of state officials? Did anyone disagree with the level of decision-making by the Academy representatives?

Dr. KASPER. Almost everyone we had a discussion with was from a state that was not on the best qualified list. They were, of course, disappointed; but the discussions did not lead to any indication that there was any information left out, or any unfairness in the process.

Chairman ROE. From where I am coming from, as far as the committee is concerned, none of the states that were not included initially further protested to the committee, that I am aware of, at that point, of those who were not on the short list. You had no further protests coming?

Dr. KASPER. As I recall, at the hearings a year ago, Congressman Lujan [5] had a number of questions. He represented a state that was not on the best qualified list.

Mr. HENRY. Mr. Chairman, Michigan made it on the short list, even though both environmental and geological data were in error to the disadvantage of the state. Nonetheless, they rated——

Chairman ROE. If the gentleman would yield, I wanted to be sure that the issues involved were considered by DOE in the refinements that Michigan made.

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[5] The Honorable Manuel Lujan, Jr., former Ranking Republican Member of the Committee on Science, Space, and Technology.

Mr. HENRY. That is exactly so. When Michigan caught that after the first slice, the new data was to have been put in; but we have received no——

Chairman ROE. That is DOE we are dealing with.

Mr. HENRY. That is correct. We have yet, to this point, to receive any criteria which indicate that in the final selection process the revised data was put in. We do know on the report of the finalists, the winners as it were, on the publication of environmental data—because environmental data in terms of something such as the wetlands was published specifically—that is, the wrong data was published.

We question whether or not the right data got in. I know they say in that instance that it would not have made a difference, but when you add to that the geological data and the borings and the drillings, we have yet to identify whether or not the right data was in the input.

Chairman ROE. I understand, but where I am coming from is, what we have to determine now, step by step, is where, if any, errors occurred, or any unfairness. Where did it happen?

What we are trying to say here, as far as our first witness, Dr. Kasper, is concerned—what we have to do is to ascertain if the members of the Academies, which I think is extremely important, handled the situation on an equitable and fair basis. We are going to then develop further as to how that was interpreted by the Department of Energy.

Mr. HENRY. Exactly. The question was whether the data base was adjusted appropriately into the final list.

Chairman ROE. The Chair now recognizes the distinguished gentleman from Illinois, Mr. Bruce. Is he here?

[No Response.]

Chairman ROE. The Chair then recognizes the distinguished gentleman from Illinois, Mr. Fawell.

Mr. FAWELL. Thank you, Mr. Chairman.

Dr. Kasper, first of all, I want to state to you that I would agree with your comments that the Academies approached their task seriously and fairly. I have no question in my mind about that.

I do have some questions about the restraints which were, unfortunately from my viewpoint, placed on the Academies so that perhaps we did not take advantage of peer review, the peer review potential, that could have perhaps made the whole process work, and have more people have more confidence in it than has been the case.

One point I want to stress—and I realize that this sounds parochial; so be it—I can understand anyone so concluding. But overlooked, it seems to me, both insofar as the Academies are concerned and insofar as the site task force of DOE is concerned—and there lies the expertise of professionals whose judgments obviously are so very important—was the fact that not every site proposal was what I guess, for lack of better wording, was a green field proposal.

The fact is that the one proposal involved—and that, of course, is Illinois—that the SSC be built upon the experience and the expertise of existing programs and facilities. To my way of thinking, this

required a different cost analysis, a difficult one that probably can never be fully settled.

Even more important, it seems to me that it constituted an immensely important public policy question, best expressed by a Nobel laureate, Dr. James Cronin,[6] whom I am quoting from, Dr. Cronin's letter directly to the Department of Energy.

During the whole evaluation process, he states that:

> Being on the scientific policy committee of CERN,[7] I have come to realize that the Europeans have an enormous advantage in having only two high-energy labs. Their concentration of facilities has produced impressive economies and a diversity of physics opportunities. If the SSC is placed in a site other than Fermi,[8] we will be starting a fifth high-energy lab. I believe it is a mistake to spread even more thinly the human resources and scarce operating funds that will be available for high-energy physics. It is crucial for the future health of particle physics in the United States that the SSC be built at Fermilab.

I noticed, in reviewing the SSC site evaluations—and again, I recognize that you folks were not involved—that this issue was completely missed; that in fact the so-called Fermi advantages would appear to have been a disadvantage. From the viewpoint of DOE, it simply is not mentioned.

I am not referring necessarily to the economies of the costs; but in regard to the immensely important policy, the issue of building on a well-functioning complex following the European example. I gather that this issue was never presented to the Academies. Is that correct?

Dr. KASPER. I think that is not correct. In fact, I can assure you that, in consideration of the Illinois proposal, the committee stated both the cost implications of building at a site that had a possible injector facility already built and the existence of an ongoing, successful scientific program in the laboratory.

Those were some of the advantages of the Illinois site, and one of the reasons why Illinois was one of the sites on the best qualified list. But those issues were discussed, and explicitly discussed, by the Academies' Committee.

Mr. FAWELL. Were they set forth in any detail in writing from the Academies back to the Department of Energy, that particular public policy question?

Dr. KASPER. The entire Academies' written report to the Department of Energy appears in the report that you have.

Mr. FAWELL. I guess I would say that I am certain that people on the committee of the Academies would certainly be aware of that, as they looked at the one site which was not a green field site. But my question is, there were constraints, or proscriptions in reference to the responsibilities, to which the Academies were to respond. That public policy issue which obviously—because Illinois was involved—there was no request that the Academies specifically address themselves to that and advise DOE of their feelings.

Dr. KASPER. That is correct. I do think that the regional resources criteria that were laid out in the site proposal allowed the consideration of existing facilities and existing local and regional

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[6] Dr. Cronin shared the 1980 Nobel Prize for Physics with Dr. Val Fitch for work on possible violations in charge-parity and time symmetry.

[7] Centre Européen de Recherche Nucléaire (Center for European Nuclear Research).

[8] Fermi National Accelerator Laboratory.

infrastructure. That was considered in that part of the consideration by the Academies.

Mr. FAWELL. I am certain that that is the case. Unfortunately, it is not even mentioned. So that, nowhere along the line, parochially, did we in Illinois feel that the unique aspects referred to by Dr. Cronin and many others in the high-energy physics community were ever formally addressed.

It almost was, we felt, totally ignored. Yet, we are aware, of course, that when CERN faced this question from a public policy viewpoint—do we build elsewhere, or do we build upon the experience and the expertise of CERN?—they opted to build on the experience and expertise which was there.

Also, I think, in Hamburg, the same question again: The option was exercised to build on the expertise which we have. I am not saying that those were correct decisions; I do not know, I am a layman on this subject. But there is a frustration in Illinois deeply felt that this issue was, first of all, never given to the Academies to directly come back and say, "We have your expertise, please give us your view on this."

Nobody from DOE ever went over to CERN and to DESY,[9] and sat down and went over all of the questions that were before them. It just seemed to us to be something that was totally ignored.

I am not saying that that was a lack of fairness, but from the viewpoint of the nation as a whole, that terribly important question not being specified—because, obviously, Illinois was involved—wasn't that a detriment?

Dr. KASPER. I think it is fair to say that the Academies were not asked to address the question of which I think you have mentioned one side. One question is: Do you site new facilities at the site of existing and successful facilities? Another question might be: What is the advantage to the nation of dispersing its centers of scientific excellence? That was not an issue that the Academies addressed.

Mr. FAWELL. Again, I want to stress that the decision that was made perhaps was, if that had been fully developed, perhaps persons such as yourself would have made that.

Chairman ROE. I am not a lawyer, but I would refer to that as leading the witness.

If the gentleman would yield to the Chair for a moment?

Mr. FAWELL. I think it is a leading question.

Chairman ROE. For sure. [Laughter.]

The earlier part of our discussion is to determine the fairness of the evaluation. If the gentleman would yield, if you recall this area—and I am not faulting his concern and the frustrations that he expressed so capably from Illinois—but if you recall, this area of discussion had considerable review when we considered the issue.

In fact, in our report that we filed, [10] on page 28, we make the following comments. We say that the committee took the position

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[9] Deutsches Elektronen-Synchrotron, the German high-energy physics laboratory facility near Hamburg, West Germany.

[10] "Superconducting Super Collider Authorization Act of 1987," Report to Accompany H.R. 3228; Committee on Science, Space, and Technology, U.S. House of Representatives, 100th Congress, First Session, October 29, 1987; House Report 100–413.

that the Secretary shall estimate these life cycles, and so forth and so on. Then, the remaining version of the section is all to the committee's effort to level the playing field as regards consideration of DOE's own existing programs, including facilities, as compared to the proposed improvements to the site.

The first six elements direct that there shall be no operating costs assigned under LCCS as to any proposal on the basis of the expected use of existing Department of Energy owned facilities.

Subsection 102(d) also precludes double counting for credits of existing DOE facilities, which are considered as part of the construction component of life cycle costs. So, we really did deal with that on a very delicate basis. That became part of the offset balance with respect to the situation on the envelopes, if you recall, with the different states as to what their participation would be within the envelope. The envelope was not to be considered, which I thought was a stupid way of doing it in the first place, but that is the way it was done. Then, the third element, that everybody would get fair treatment.

So, this was dealt with. I am not faulting the gentleman's concern, but we have lived long enough to see something which I would like to share with him for a moment, if you will, today. It is important to get on the record.

Just the other day, Carlo Rubbia, now the Secretary General of the whole operation at CERN,[11] came in and visited with me. A year or so ago, when we talked to those people at CERN, you may or may not recall, they mentioned to us that they were concerned whether the United States should go into this program at all, it might be duplicating facilities, blah, blah, blah, the whole bit.

When in fact, what they were concerned about was, would our machine be of such capacity and size that it would, in effect, overshadow what they were doing.

Now, Secretary General Carlo Rubbia, who is also a Nobel Prize winner and one of the leading persons in this area, said to us, he wants to commiserate further with the Committee as to what the steps should be as far as he was concerned, in dealing with the United States now, so that they can further educate their people in that exchange of personnel, in exchanges of scientists and so forth and so on.

So, if the gentleman would yield one more second to me, we are concerned about this issue; but that was not part of the direct responsibility of the Academies in their particular charge. I believe I am correct in that.

That does not mean that your position is not valid; believe me, I understand where you are coming from.

Mr. FAWELL. No. Thank you, Mr. Chairman. Again, I want to bring out the point that I do favor the building of the SSC. I lament that we never took advantage—I know that we in Congress, many of us, like myself, being laymen—were concerned with that, and we discussed it.

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[11] Dr. Rubbia headed the CERN team awarded the 1984 Nobel Prize for Physics following identification of the elementary *W* and *Z* particles predicted by unification of the electromagnetic and weak nuclear force.

It does not show up in your discussions and your recommendations, does not show up in your report. It is totally missing here, and that I find to be deeply important.

Just one other minor point. You also did stress in your testimony that there was a proscription against ranking. May I again observe on this same line of thought that, believing in peer review—I know Dr. Frank Press does, and I know you do and every member of the Academies' committee does—yet, once again, having the opportunity to get peer review recommendations, indeed, as to which one was the best site was totally lost. By careful proscription, perhaps with the best of motivations, we once again dropped the ball, it seems to me.

A lot of this, Mr. Chairman, is hindsight observation on my part. I was not doing as good a job perhaps as I should have in noting that. We lost a great opportunity. There was no peer review here, in terms of scientists coming in and saying, "Ladies and gentlemen of Congress, Mr. Secretary of the DOE, in our studied judgment the best ways would be 'X', or to build on, or to indeed go to a new site entirely." Don't you think this was a detriment?

Dr. KASPER. I am not certain that that was a detriment. I think that both the Department of Energy, Congress, and the American people got the benefit of the Academies' review, which concluded that an SSC could be built and operated on any of the sites that made it onto the best qualified list. That provided an assurance, to the extent that one accepted the Academies' judgment, that no matter how the decision was made we would have a site where the SSC could be effectively and efficiently built and operated.

Mr. FAWELL. May I add just one point? I know I have taken more time than I should, Mr. Chairman.

Chairman ROE. If the gentleman will yield, do you know why I am giving you more time? Because you are driving at something. I think you are one of the most forceful and most effective members of the Committee in the whole process. I want to say that publicly.

You know, you did a great deal, and you continue to strongly support this issue; so I will give you more time. But I do not want you to feel that your efforts have not been respected, because they have, by the Chairman, genuinely.

Mr. FAWELL. The peer review aspect, again. I have noted that with most of our major projects indeed we seek peer review as to when and where something is constructed. I think that is fine. I am giving my opinion now. In hindsight,—why didn't we take advantage of you fellows? Perhaps we would not be wrestling now with this question of how objective a decision was. The only other point is, there is no way to get in that.

Chairman ROE. In hindsight, I don't know why they did not select New Jersey. [Laughter.]

The Chair recognizes the distinguished gentleman from Illinois, Mr. Costello.

Mr. COSTELLO. Thank you, Mr. Chairman. I am a supporter of this project; however, I am disappointed that Illinois was not selected.

Let me ask just a few questions. Doctor, how much time was the Academies' site selection committee given to make a complete review of the short list and the recommendation?

Dr. KASPER. From the time we got the proposals, about three months, almost exactly three months.

Mr. COSTELLO. Do you feel that was an adequate time to review the short list, and to make a recommendation?

Dr. KASPER. We reviewed all of the proposals that came up there with the short list. It put a lot of pressure on the committee, all of whom had other positions, but I think that the committee felt that it had enough time, given the amount of work it had to do during that three-month period, to make an adequate determination of the best qualified set of sites.

Mr. COSTELLO. When you reviewed each application, did you make a comparison of the sites? In other words, once you got a list of all of the applicants, did you compare one site against the other?

Dr. KASPER. There was no one-on-one comparison. Each of the subgroups looking at the criteria discussed the extent to which the various sites met or did not meet the criteria. In the end, one could say that the determination that there was a set of best qualified sites indicates that those were compared to the others.

But if you are asking, did we compare, say, Illinois to Texas, the answer is "No."

Mr. COSTELLO. Are you satisfied that the site that was selected in Texas is the most economical site for construction of the SSC?

Dr. KASPER. As I indicated, from the cost information that was provided to us by the Department of Energy, it was difficult to find major differences in cost among any of the sites of the 35 we were reviewing. That is, to the best judgment of this committee, the uncertainties in estimating the costs were considerably greater, or likely to be considerably greater, than the differences in cost that came out of the cost model that DOE used.

Mr. COSTELLO. Let me ask you for all of the applicants, all of the sites, did you do a rating based on the cost of construction of the SSC on each one of those sites?

Dr. KASPER. We received from DOE cost estimates for each of the sites, so we had those numbers.

Mr. COSTELLO. Where did the State of Texas site that was selected, where did that site rank on the list?

Dr. KASPER. The report actually comments on that. The report says that, according to the life cycle cost estimates provided by DOE, the construction and operating costs for the super collider located at the Dallas-Fort Worth site would be slightly less than the mean cost for all proposed sites, but the difference from the mean is smaller than the likely accuracy of the estimates themselves.

Mr. COSTELLO. What does all that mean, Doctor?

Dr. KASPER. What it means is that, if you looked at the numbers that were provided by DOE, the Texas site was a slightly below average site in cost, but so slightly below average that that difference would be lost in the uncertainties of the cost estimates themselves.

Mr. COSTELLO. I think you understand where I am going with my line of questions. I just wonder if you can tell us how many other sites we would have been able to save money with, with the SSC, in constructing the project on other sites. How many other sites would have been less than the site that was selected in Texas?

Dr. KASPER. I do not have that figure, but if it was around average, I would say something like 18 of the 35 or 36 sites would have been below average, and about the same number above average.

Mr. COSTELLO. Thank you very much.

Thank you, Mr. Chairman.

Chairman ROE. I thank the gentleman.

The Chair recognizes Mr. Wolpe from Michigan.

Mr. WOLPE. Thank you very much, Mr. Chairman. Mr. Chairman, I want to pursue Dr. Kasper's observation that the mandate that was given to the Academy of Sciences incorporated a prohibition on ranking of sites.

What I would like to know is, was there any extended discussion between the Academy and the Department of Energy at the time that the assignment was given to the Academy about the wisdom of going beyond simply identification of sites to actual ranking of sites?

Dr. KASPER. I believe there was some discussion between the presidents of the academies and the then-director of energy research, Dr. Trivelpiece,[12] about that. It was the Department of Energy's view that they wanted an unranked list.

Mr. WOLPE. Did they ever spell out the reasons that that was their position?

Dr. KASPER. As I recall, the only stated reason was that, if in fact the Academy had been asked to provide a ranked list, that would have looked the same as making a decision about the final site. What the Department of Energy wanted from the process was a set of sites, among which it would choose the final site.

Mr. WOLPE. Presumably, the reason for involving the Academy of Science in the first place was to essentially take politics out of the process, to make sure that the scientific criteria would be the ultimate criteria on which the site selection would be made.

Would it not have made sense, if the purpose was to maintain the scientific integrity of the process, to ask the Academy to go beyond the identification of numbers of sites, to an actual ranking of those sites?

Dr. KASPER. I am afraid I am not really in a position to answer that question. It is the determination of the Department of Energy, which was charged by this government to make the decision.

Mr. WOLPE. I am not questioning. I understand that. But, for example, had the Department of Energy requested the National Academy of Sciences to go beyond the listing of such to the ranking of such, would they have resisted that request?

Dr. KASPER. I suspect the Academies of Science and Engineering would have been very nervous, but probably would have in the end gone ahead and provided the assistance.

Chairman ROE. Would the gentleman yield?

Mr. WOLPE. Sure.

Chairman ROE. The Committee and the Congress made it abundantly clear that, in the complexity of those lengthy hearings we held, we did not want the Academy of Science or the Academy of Engineering to decide where the site was going to be. That would

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[12] Dr. Alvin Trivelpiece, now director of the Oak Ridge National Laboratory.

be tantamount to saying that, for anything that was done in technology in the country, the sole arbiter, if you like, of the whole thing would be the Academy of Sciences. In no circumstances would we want that kind of an arrangement.

Mr. WOLPE. Again, I need to ask the question as to whether the Academy, Mr. Chairman, was asked to decide. I simply asked if the Academy was asked to rank order. Presumably, the Congress in its wisdom, and this Committee in its wisdom, may have found reasons to override the ranking, but it would have been useful at least to know what the scientific community had evaluated as the technical criteria of merit for the relative sites.

I do not understand why the request for a ranking on the basis of technical scientific criteria——

Chairman ROE. If the gentleman will yield further, they were not dealing in a ranking in scientific issues at all, fundamentally. What they were dealing in is, what was the best economic location. The only element that would be separate from that would have been the injector, as far as Illinois was concerned. That was the only relationship in any of the sites in the country that was involved, to my knowledge.

Consequently, all of the elements that are involved—and supporting the gentleman's view—all of the other elements involved had to do with support facilities, had to do with water resources, sewer, water, power, had to do with the academic community and capabilities in the area, et cetera, et cetera, et cetera.

So really, the issue of whether or not we should be locating the Superconducting Super Collider in any place in the country, the only turning point, would have been in Illinois. The Committee recognized that during the whole process of the hearings. Otherwise, we might just as well have said, "We'll put it in Illinois," in which case Michigan nor New Jersey nor Texas would have subscribed to that issue.

We were looking through a broad balance throughout the country, in determinations by the Congress on the merits of the case; not on the economic dynamics, and who was to get what at the table. That was the basic premise of the hearings.

I thank the gentleman for yielding.

Mr. WOLPE. I thank the Chairman.

A further observation. I was obviously not a member of the Committee at that point. I was not privy to some of those hearings and some of that process. But as I understood it at least, one of the reasons we wanted to involve the Academy of Sciences was precisely in order to end up with some kind of essentially non-political, scientific, technically-based evaluation of at least the sites that would be best suited for this.

Chairman ROE. Would the gentleman yield further? I would like to ask that question.

You, as the representative today from the Academy of Sciences, do you feel, in your judgment, in your knowledge of the issue, that there was no political interference; that the Academy decided on the basis of the Academy's view of the issues they were asked to review?

Was there any chicanery, any politics? Did anybody come to you and say, "We should do this, or that," or anything?

Mr. WOLPE. If the Chairman would yield, that was not the thrust of my question.

Chairman ROE. That is the thrust of my question. [Laughter.]

Mr. WOLPE. That is fine, then. That is of interest to you. That was not mine.

Chairman ROE. Do you think there was anything of that nature?

Dr. KASPER. I can say unequivocally that there was no political chicanery.

Chairman ROE. Any questioning by any members of Congress, or any question by the administration at all?

Dr. KASPER. There was no attempt by anyone to apply political pressure to the Academies.

Mr. WOLPE. I am only making the observation. I was trying to understand, Mr. Chairman, the full rationale for why the Department of Energy did not request of the Academy some greater specificity from the scientific and technical standpoint on how these sites would have been dispositioned, that is all.

Chairman ROE. Would you care to respond?

Dr. KASPER. Again, that is a question I think you could address to the Department of Energy.

Chairman ROE. If the gentleman would yield, I think what he is saying is something a little bit different. Do you feel, in your judgment, that the charge that was given to the Academy was broad enough scientifically, where the Academy was not just parroting or filling out a particular set of circumstances, but that it had a broader, more detailed, in-depth scientific charge?

Dr. KASPER. I think the charge to the Academies was certainly sufficient. I do agree with the Chairman's comment that the review was not a scientific review, as such. There were some aspects of the siting that were scientific, the geology.

Chairman ROE. Mr. Wolpe was saying, should it have been more scientific in nature.

Mr. WOLPE. Or more precisely, with respect to at least the scientific and technical questions, might there have been a request for greater precision from the Academy?

Dr. KASPER. As I say, there might have been a request to rank on the scientific criteria; but it seems to me, it would have been important at that point to note that many of the criteria—indeed, most of the criteria—are not scientific in and of themselves. They involve judgment of the people that ask the question, as the Chairman has, whether you want to leave judgments of that sort to the National Academies of Sciences, or whether those were more appropriately judgments made by government officials.

Mr. WOLPE. That is a fair comment. I appreciate that.

Chairman ROE. The Chairman recognizes the gentleman from Texas, Mr. Hall.

Mr. HALL. Thank you, Mr. Chairman. I share the Chairman's leeway according to Mr. Fawell and the other members and the states that were not finally selected. I just want to ask Dr. Kasper a word or so.

You played no part in the final decision, obviously, in the selection of Texas?

Dr. KASPER. The Academy played no role from the point at which the best qualified list was submitted.

Mr. HALL. You did talk with those states that did not make the final cut, the final eight. You and Dr. Press and Dr. White discussed their disappointments.

Dr. KASPER. With those states that asked for comments.

Mr. HALL. Did any of the state officials raise questions or concerns at that time that might have made some impact that caused you to change the decision that you and the Academy had reached after the selection of the eight?

Dr. KASPER. No.

Mr. HALL. And you accorded them every opportunity to do that, did you not?

Dr. KASPER. That is right. We offered to sit down and discuss the process and the way we went about our business with any state that asked to discuss it.

Mr. HALL. I think Mr. Costello brought out that you took three months. You made the report in three months. Accepting the fact that you probably could have studied it a year—sometimes, you think you never really have enough time, unless you put a cut-off time. Things are, here in Washington, studied year-in and year-out.

Do you think that three months gave you a reasonable length of time to make the decision that you and your colleagues in the Academy made?

Dr. KASPER. Yes, I do. I think it was a very intense process; but I think there was sufficient time.

Mr. HALL. All right, sir. You took the three months, and you feel that that was adequate time. How long did the Department of Energy then study your recommendations and your findings and study the particular eight that were selected, before they made their decision and their recommendation?

Dr. KASPER. We presented our report to the Department at the very end of 1987, late December of 1987. I do not recall the exact date on which the Department made its decision presumably to use the intervening time to do its review.[13]

Mr. HALL. And you used a lot of the information furnished by the Department of Energy, did you not, in arriving at your cut-off?

Dr. KASPER. Actually, with the exception of information on the cost, which was provided by the Department of Energy, the committee used only information that appeared in the proposals prepared by the states.

Mr. HALL. All right, sir. You stated that it is difficult to find major differences in cost. Texas was slightly below the average in cost. Let me ask you this question. On some technical evaluations that I understand were made by the DOE comparing, for example, Illinois, that Mr. Fawell and Mr. Costello inquired about, to show the total life cycle costs to be 10.4 to 10.9 [billion dollars], I think the gentleman from Illinois suggested that those were maybe conservative figures; that perhaps, if they had studied more information and read more documents, that figure would have been closer to an even 10.0. Is that right? The gentleman from Illinois?

Mr. FAWELL. I did not really get into the cost aspect in my questions. If the gentleman would yield, I think that is elaborate.

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[13] Dr. Kasper amended this sentence to read: "I do not recall the exact date on which the Department made its decision—it presumably used the intervening time to do its review."

Mr. HALL. You do not have real figures on those who had promoted Illinois at the final site, on the life cycle costs?

Mr. FAWELL. There are differences in various experts as to whether the correct model for life cycle costs was even presented. That was a terribly intricate area for one to pursue. My feeling is that, by not replicating the SSC somewhere else, it would have been much cheaper to build it in Illinois, but that is just my opinion.

Mr. HALL. I would ask Dr. Kasper—isn't it a fact that Illinois was given credit for the location of Fermi there, and the obvious expertise that they have there? Was that not taken into consideration in the cost, in the total life cycle cost, in arriving at your final eight?

Dr. KASPER. We received from the Department of Energy costs for the Illinois site, with and without Fermilab factored in.

Mr. HALL. And you have seen the life cycle cost that shows Illinois at 10.4 to 10.9, and shows Texas at 10.8; have you not?

Dr. KASPER. I do not know. Precisely which chart do you mean? I do not recall the precise numbers, but the fact is that even with credit for Fermilab, given the model that DOE used to generate the costs, it is difficult to take the cost figures and turn that into a real determinant of the appropriateness of the site.

Mr. HALL. That was one of the bundle of sticks that you all considered among all of the entire bundle in the basket?

Dr. KASPER. That is correct.

Mr. HALL. Actually, you were not allowed to consider the one billion dollars, approximately, that the people of the State of Texas had voted toward this project?

Dr. KASPER. That is correct. That was the information that was in the so-called envelope that was not supposed to be opened until the choice was made.

Mr. HALL. I think there were some bills passed up here. It seemed like the gentleman from New Mexico, or Arizona, or somewhere, had a bill that precluded consideration of that.[14] Had that been taken into consideration on the life cycle chart, when they talked about the SSC life cycle chart estimates for constructions, plus the 25-year operating period and billions of 1988 dollars—Illinois was shown to be 10.4 to 10.9.

Let's give the fact that you maybe did not consider all of the attributes that Fermi would continue. Even with Texas at 10.8, if you put that billion in there, that would have put Texas in at 9.8; would it not?

Dr. KASPER. To be perfectly fair though, no one opened the Illinois envelope, so we do not know.

Chairman ROE. If the gentleman from Texas would yield to the Chair.

Mr. HALL. I do yield to the Chair.

Chairman ROE. I do not think we can really post-operatively determine what did or did not happen on the way to the forum in that particular direction, from that point of view; because, if you

[14] Mr. Hall refers to an amendment introduced by the Honorable Pete Domenici, Senator from the State of New Mexico, to Title I of the Fiscal Year 1987 Supplemental Appropriations Act (Public Law 100-71).

recall, we made it abundantly clear, the Committee did, almost unanimously, that the contribution of any state would not be considered as part of the overall picture. So I do not think it serves the purpose, if the gentleman will indulge me, to make that comparison at this point.

Mr. HALL. The only purpose, Mr. Chairman, I would hope it would serve was the same purpose that the Chairman was serving by allocating the members from Illinois additional time just to show fairness.

Chairman ROE. I can give you all the time you need to show fairness.

Mr. HALL. And I am interested in Mr. Fawell being able to go back to his district, back to his state, and to say that he was accorded a full hearing and that he represented his state properly, as Mr. Costello and others have, because they did.

But in the interest of showing fairness here, we have shown the length of time that it was studied, that that was an acceptable length of time, and that these men were not pressured or pushed by any particular political person. They were not strong-armed. Some of the figures they took into consideration on the total life cycle costs, had they considered what is in fact today, that there is a billion dollars of Texas money down there, 700 million there, to reduce construction costs—that that would have lowered the total life cycle. It was up at 10.8.

Mr. WALKER. Will the gentleman yield again? I think the Chair is trying to point out that these are hypothetical issues that you are bringing up, which I don't think have a bearing at this point; particularly with this witness. Because the purpose of this witness was to give the committee the overview of their observation of what the National Academies were charged to do.

Now, whether they were charged properly by the Department of Energy is a question that I think a lot of people have. Whether or not they evaluated the capability of Fermi was not before them. They were precluded from doing that by the committee itself.

Now, whether the Department of Energy, which I think is the next most cogent witness group to deal with—I think the purpose is, was it fair and square, and did they do the right thing for all 50 states, as they were charged to do? Had they done that, then we can thank the distinguished gentleman for his contribution, and get to the meat of the issue which was, how was it interpreted and how in effect was it evaluated by DOE? Because the decisions were not made by the Academy; they were made by DOE, fundamentally.

Is that a fair appraisal?

Dr. KASPER. It is certainly a fair appraisal of what happened.

Chairman ROE. You are not in a position to credibly evaluate whether or not somebody contributed. If somebody contributed funding, because they were precluded from doing so, what would have happened?

Dr. KASPER. I think that is true.

Chairman ROE. I will give the gentleman from Texas all the time he needs. Go ahead.

Mr. HALL. I thank the Chair's indulgence. I have matters that I needed to be in the record, and that are in the record now, and I yield back the balance of my time.

Chairman ROE. I thank the gentleman.

The Chair recognizes the distinguished gentleman from Missouri, Mr. Volkmer.

Mr. VOLKMER. Thank you, Mr. Chairman. It is good to be from a state that did not make an application. [Laughter.]

I think it will ring a little more objectively. I would like to go back a little bit, Dr. Kasper, on the procedure that the Academy followed.

As I understand, after basically setting up your committee and deciding how you were going to do this, you broke up into subgroups, and the subgroups made their decisions on each individual proposal out of the 35; right?

Dr. KASPER. That is correct.

Mr. VOLKMER. Then they came back all together, and that is when you decided which ones would be the best qualified?

Dr. KASPER. That is correct.

Mr. VOLKMER. There was, or was not, any number of eight decided? I mean by that, beforehand.

Dr. KASPER. There was no number decided. The number was the number that came out after the sites would be the best qualified; it was when we counted and came to eight.

Mr. VOLKMER. That was out of the 35?

Dr. KASPER. Correct.

Mr. VOLKMER. What concerns me just a little bit is, all the members of that committee voted on best qualified; correct?

Dr. KASPER. That is correct.

Mr. VOLKMER. Did you vote on each one? In other words, somebody put that question, should this proposal be on the best qualified list?

Dr. KASPER. Precisely.

Mr. VOLKMER. Did the 21 members vote on that, yes or no?

Dr. KASPER. They all agreed unanimously that the eight sites were the ones that belonged on the list.

Mr. VOLKMER. And you went down the list as you all voted?

Dr. KASPER. As we discussed each site and completed the discussion of the site; and then asked the question, "Does this site belong on the best qualified list?" In each case, there was agreement among the members of the committee that the site either belonged on the best qualified list, or did not belong on the best qualified list.

Mr. VOLKMER. Okay. Now, out of the 21 members, was each member a member only of one subgroup?

Dr. KASPER. No. Some members of the committee served on more than one, because their expertise spanned the areas of interest of more than one of the subgroups.

Mr. VOLKMER. Then they attended several. When you are voting on an overall, and if I have only worked on geology or regional resources—basically those were the big ones—yet I get to vote on all other things that I did not really review very well, or had time to, or discuss—is that correct?

Dr. KASPER. We did discuss them. It was true that the detailed analysis was done in the subgroups. For instance, the geology subgroup looked carefully at each proposal's geology discussion and came to conclusions about how well or how poorly the proposal met the criteria.

When that went to the full committee, there was a discussion by each subgroup of their findings about any given proposal, before the members were asked to decide whether or not a proposal belonged on the best qualified list or not.

Mr. VOLKMER. So there was a pretty thorough discussion of each one by somebody in the subgroup before they all looked at them?

Dr. KASPER. You are correct.

Mr. VOLKMER. You have satisfied my concern.

My other concern is that, when you made your preliminary ratings on the best qualified list, you used rankings of "good," "satisfactory," "questionable," and "no basis" on the utilities. Is that correct?

Dr. KASPER. That is right.

Mr. VOLKMER. Those rankings, who made the first determination to use those rankings?

Dr. KASPER. Before the committee even received the proposals from the Department of Energy, it decided that it would use those adjectival ratings.

Mr. VOLKMER. I understand that, rather than numerical. I understand that. But who made that decision: You, or the DOE?

Dr. KASPER. No, the committee made that decision.

Mr. VOLKMER. To use "good," "satisfactory," "questionable"?

Dr. KASPER. That is correct.

Mr. VOLKMER. Fine. Because one thing—and it is not a question for you—but I just do not understand, in the setting of ratings that you all found of the eight, "good" or "satisfactory," of all of those I find no "questionable" within those.

Dr. KASPER. One of the features of the eight sites that ended up on the best qualified list was that they were all very good sites. The questionable ratings were to be found largely in sites that did not make it to the best qualified list.

Mr. VOLKMER. Thank you, Mr. Chairman. I think my next question is going to have to wait for the gentleman from the Department of Energy, because I do not think they came to that same conclusion that you did. Thank you.

Chairman ROE. The Chair recognizes the distinguished gentlelady from Maryland, Mrs. Morella.

Mrs. MORELLA. Thank you, Mr. Chairman. Of course, I think you should have been in Maryland, but Maryland was not even one of the 35 sites selected.

Chairman ROE. Nor New Jersey.

Mrs. MORELLA. So we have much in common.

I wanted to pick up on this whole question that has been asked of you, Dr. Kasper, about being imposed upon you and the National Academy, how you were going to go about doing this. I realize that some of that is not within your purview, to make the decision; but as a former educator, and as I look at the criteria, what particular criteria did you have under what is outstanding, versus good, and the other kind of ratings?

You must have had something that you set up for the committee to look at to make this judgment. I do not see anything in your testimony about that.

Dr. KASPER. One of the things, as I indicated in my testimony, that the subgroups did was, while they were waiting for the proposals to be written and submitted to DOE, they had discussions and meetings with people with experience in the various areas.

For instance, there was a meeting with laboratory directors of large scientific facilities worldwide, to discuss those aspects of, say, regional resources that were in fact most important in constructing, starting up, and operating the laboratories.

The subgroups of the committee had long discussions of just which factors within the criteria were most important in the actual operation of large scientific facilities; but it is true that the decisions by the committee were largely best judgments, as opposed to any specific rating or numerical or very hard tangible.

Mrs. MORELLA. I know we discussed the numerical ratings as being perhaps more objective, but that is what I am getting at. I know you did not make that decision. You probably would have preferred a numerical rating, though.

Dr. KASPER. I am not certain of that. We discussed that at some length, and it is not at all clear that numerical ratings would have appeared more objective—but it is not at all clear with the numerical ratings of things like regional resources.

Mrs. MORELLA. Except it is easier to do the outstanding, versus the good, versus the other, I suppose.

Dr. KASPER. It may be. It just seems to me that putting numbers on such things is more likely to give them an appearance of objectivity than it is to actually create or prove objectivity in the decision.

Mrs. MORELLA. I find it amazing that you were able to fulfill this in three months. You are talking about 35 sites, you are talking about on-site visits, you are talking about a committee of 21, you are talking about experts in each of the six categories. Do you realize, I just did my little multiplication, if you had 35 sites and six criteria for each site, that is 210 presentations that had to be made within that three-month period, plus the on-site visits.

How, in heaven's name, despite the fact that you are all brilliant and experts, did you do it in three months and feel that you did a complete job?

Dr. KASPER. Let me just correct one thing. We did not make on-site visits.

Mrs. MORELLA. There were no on-site visits?

Dr. KASPER. That we probably could not have done within the three-month period.

Mrs. MORELLA. It must have been even tougher to do without on-site visits.

Dr. KASPER. In one sense, it was tougher; that is, we did not have whatever information one could have gotten during an on-site visit. On the other hand, it was made clear to the proposers in the Invitation for the Site Proposal and in the conference at which that

was discussed,[15] that there would be no site visits by the Academies' committee.

We did recommend, incidentally, that the DOE make site visits, in narrowing the list from eight to one.

Chairman ROE. Will the gentlelady yield?

Mrs. MORELLA. Yes, indeed, Mr. Chairman.

Chairman ROE. I was aware that the Academy, per se, did not visit the sites. I suppose I should really hold that question for DOE, but to your knowledge did DOE visit all the sites? In other words, were there any site visitations of those who were not on the short list, to your knowledge?

Dr. KASPER. I really do not know.

Chairman ROE. I will ask the gentleman from DOE. I yield back. I thank the gentlelady for yielding.

Mrs. MORELLA. I appreciate what you have done. Thank you, Mr. Chairman.

Chairman ROE. The gentleman from California, Mr. Packard.

Mr. PACKARD. Thank you, Mr. Chairman. Most of my questions I think will be reserved for DOE, but did all of the necessary information and documentation requirements, et cetera—were they equally passed to all of the states? There was no material that was given to some states that was not given to others?

Dr. KASPER. Not to my knowledge.

Mr. PACKARD. And in your evaluation, looking back, with the benefit of hindsight, which all of us are now looking at, do you see any need for reevaluating the final selection?

Dr. KASPER. I really have not looked at the final selection. I think that the process by which the best qualified list was arrived at was done in a way that, as I said, would assure this committee and would assure DOE and assure the country that at any of those sites you could build a good SSC.

I am not familiar enough with the process by which the eight were reduced to one, to comment on that.

Mr. PACKARD. I really do not have any other questions.

Chairman ROE. The Chair recognizes the distinguished gentleman from Missouri, Mr. Buechner.

Mr. BUECHNER. Thank you very much. Being the one who had offered the amendment on the floor to strike some of the money from SSC, having heard some of my learned colleagues, such as the Speaker [16] and the Minority Leader,[17] speak against it, I am a little bit, I guess, out of the loop on this one here.

I would like to ask you a question about the evaluation committee. We have our little siting book here. Can you tell me how many members of that site evaluation committee would be deemed high-energy physics oriented, either from an administrative or an academic standpoint?

Dr. KASPER. I would have to look at that, at the list.

Mr. BUECHNER. If you do not know, will you look at it immediately?

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[15] The Department of Energy held a preproposal conference for States bidding on the Superconducting Super Collider April 29, 1987.

[16] The Honorable Jim Wright of Texas.

[17] The Honorable Robert Michel of Illinois.

Dr. KASPER. I would say six or seven, perhaps.

Mr. BUECHNER. Six or seven out of about what?

Dr. KASPER. Twenty-one.

Mr. BUECHNER. All right. The reason I asked is, I think one of the most prevailing criticisms that I have heard of the idea of putting our bags in the super collider basket is that America has this love of high-energy physics, and it has directed the way in which we have done a lot of our federal scientific assistance. I just was wondering how it was from the committee's standpoint.

Is it your opinion that the people who were looking into it were not just in love with high-energy physics, but were trying to find the best location, using the criteria that were set forth by the legislation?

Dr. KASPER. I think that latter is the case. There was never an issue before this committee as to whether or not there should be an SSC, or the benefits or values of an SSC. I do not even know how all of the people on the committee feel about whether or not we should have an SSC. I do know that they are all committed to help find the best sites out of the proposals; that they did.

It was never a matter of discussion in the committee, the question of the benefits of having an SSC.

Mr. BUECHNER. Thank you. I yield back my time, Mr. Chairman.

Chairman ROE. The Chair recognizes the distinguished gentleman from Pennsylvania, our ranking member, Mr. Walker.

Mr. WALKER. Thank you, Mr. Chairman. I am a little concerned about the process, and I am following up primarily on the direction Mr. Wolpe started to go in, that what happened here was that on one of the major scientific projects of our time, the Academy of Sciences ended up somewhat circumscribed in what it could evaluate.

Would you agree with that evaluation, that the Department of Energy very definitely narrowed that which you were asked to look at?

Dr. KASPER. Yes, I think that is true. We had an explicit charge that was laid out by the Department.

Mr. WALKER. Would you have any evaluation for us, as to whether or not you think you had a very narrow agenda, or whether or not it was just a little bit narrow?

My perception is that you had a very narrow agenda.

Dr. KASPER. I think it was the committee's view that, given the charge that it had, and the set of proposals that it had to review, it was able to come up with a list it was confident of by the end of the process; that it was confident that at any of those sites you could build an SSC.

So to that extent——

Mr. WALKER. But you did not go into the geological formations.

Dr. KASPER. Absolutely, we did. Geology was the most important criterion listed.

Mr. WALKER. But there was no comparison among the various sites as to which was better?

Dr. KASPER. What there was, was a comparison of each site's geology against the criteria to be met, to see whether those sites provided adequate geology for an SSC.

Mr. WALKER. Had you evaluated climate the same way?

Dr. KASPER. There was included in the set of criteria laid out by DOE, climate.

Mr. WALKER. If I understood you a minute ago though, when it came down to the selection of the final party, you were not involved in that process whatsoever.

Dr. KASPER. That is correct.

Mr. WALKER. You basically laid out and said, "Here are eight sites that meet the criteria"; but when it came down to the actual selection of one final site, which is obviously the most important part of the whole process, the Academy of Sciences was not in on that?

Dr. KASPER. That is correct.

Mr. WALKER. Would you agree with me that that is a somewhat narrow mandate given the scientific community?

Dr. KASPER. As I indicated earlier to the Chairman, I am not exactly sure that one would want decisions about where to place major scientific facilities placed in the hands of the National Academy of Sciences, or any group of scientists for that matter.

The overall decision is one that involves a lot more than just science.

Mr. WALKER. My concern is, as far as this committee is concerned, this is one of the single biggest science decisions we will make, and it will affect science for not only high-energy physics, but will affect science across the board for the next decade.

Now, what I am concerned about is, in making that decision, the scientific community was consulted, but no more. I guess what I am trying to ascertain is, whether or not there is some concern within the science community, and particularly within the Academy, about the fact that you were given little more than a consultant's role in making this fundamental decision about scientific priorities.

Dr. KASPER. I think the reason there is not a lot of concern within the Academy about this problem is that the committee and the Academies themselves were reasonably satisfied at the end of the process that we had come up with a set of sites any of which would have been a good site for the SSC.

Mr. WALKER. I understand that, but is the substance, in terms of site, the role that you think you should have played? I mean, you do not think that there was more that should have been contributed by the scientific community than that very narrow kind of determination?

Dr. KASPER. Again, I am not sure how much more the scientific community could have provided, or would have been asked to provide, given the fact that final judgments about the site hinge on things other than the science itself, and therefore should be the responsibility of Congress or government officials, as opposed to groups of scientists.

Mr. WALKER. I guess I understand the point that you are making, and obviously that is the reason why the ultimate decision had to lie in the Department of Energy; but it seems to me that you were taken completely out of the loop of the decision-making here, and set aside, and were given only a fairly narrow mandate, and then ultimately the decision was made using other criteria

other than science, having cleared the way with a somewhat consultant role that was provided you.

I find that somewhat troubling, when it is going to have such a dramatic impact on science.

Chairman ROE. If the gentleman will yield, however, I think that in the process the Committee held—and as you know, you participated in extensive—what is the word I want to use? I want to use a gentle word. It was not gentle at all; it was a very confrontational set of hearings, where different people had different feelings—big science versus small science, blah-blah-blah. A whole plethora of witnesses testified over a long period of time.

So I think, to put the issue into perspective, as Mr. Walker is bringing it forth, that part of it has been over with. The Committee has decided, yes, we were going to go ahead with the Superconducting Super Collider; but in order to do that, what should our next step be, vis-a-vis the point of location?

So the charge of the Academy at that point was for the particular purpose which they carried the work out for.

Mr. WALKER. But it seems to me that our charge also to the Department of Energy and all parties concerned was, having made the decision to go ahead with it, that we get the very best site that could possibly be obtained.

Chairman ROE. Agreed, and in the most fair manner.

Mr. WALKER. In the most fair manner. But in this instance, we end up with a process where the scientific community did not even make a recommendation on the final selection. All they did was, they gave us a broad category from which the Department of Energy ended up with considerable discretion that may have been well in the hands of the Department of Energy; but I would suggest that, as people concerned about science and the ultimate science budget, we probably should have had a fairly clear recommendation.

Chairman ROE. Would the gentleman yield further?

Dr. Kasper testified to the point of view that it was the determination of the committee of the Academy that any of the eight at that point—New York withdrew—any of those seven sites would have been an excellent site for location of this facility. Wasn't that correct?

Dr. KASPER. That is correct.

Mr. WALKER. I understand, but my point is, my guess is that that is not what we expect out of the scientific community, given the level of the commitment we are going to make here. I think, from the scientific community, we expect more than that, to tell us more than that there are eight sites that meet the criteria that have been given to us by the Department of Energy.

I think the scientific community owed us a recommendation of what they thought was the very best site out of those eight, to the Department of Energy.

Chairman ROE. If the gentleman will yield, the purpose today is to oversight and overview, to satisfy ourselves that the proper procedures were followed. When Energy talks, that will be very important.

If the gentleman will yield further, however, we also have to determine, after we listen to our testimony and so forth, what the

next step is going to be. That is going to be the authorization of the project. I am sure we will have considerable discussion on that issue.

Mr. WALKER. That is the reason why I was asking the question, whether or not Dr. Kasper felt that, from the standpoint of the scientific community, the mandate they were given was too narrow. I did not mean to make it that specific, but that is in essence what I was trying to get at, because I think then that we need to follow that up with the Department of Energy, if in fact the scientific community believes that their mandate was too narrow. I think that is something we do have to look at.

Mr. PACKARD. Would the gentleman yield for a moment?

I thought that the ground rules were established and approved by this Committee before going in. Now, in the aftermath, it would be easy to see whether there might be some shortfalls or some things that we would have liked to change; but I think they did follow the ground rules that were established in determining what role the Academy would play, and what role the Department would play, and what role the Administration and this Committee would play.

I think they followed those ground rules. Now, if we are not satisfied with those ground rules, then I suppose that we did not do our job when we actually reviewed the ground rules.

Mr. WALKER. Some of us were not real happy with the ground rules the way they were set out. So I guess in that sense, there is somewhat—I will follow through on this too, but I would appreciate an answer to the question: Was your mandate too narrow?

Chairman ROE. In your judgment.

Dr. KASPER. In my judgment, it was not. In my judgment, a request to the Academy to determine sites that would be good sites for the SSC, which is what we were asked to do, was an appropriate request; and a decision among sites that would technically be able to support an SSC was most appropriately a decision made by government officials or the Congress.

Mr. WALKER. I thank you for your opinion.

I would say that the problem is that I think what you have done is, you have abdicated the role of science, and made it far more of a public works project. So therefore, what we have had is a public works evaluation, rather than a scientific evaluation. From my personal perspective, that is a shame. Thank you, Mr. Chairman.

Chairman ROE. Thank you. I thank the gentleman from Pennsylvania.

We thank the witness for being very, very patient.

I beg your pardon, you were not on the list. I am sorry. The Chair recognizes the distinguished gentleman from Pennsylvania, of course.

Mr. RITTER. I appreciate my colleague's recognition. [Laughter.]

I would like to ask you a couple of questions. Have you had a chance, or has the committee in any way, shape, or form, reviewed the final DOE selection document?

Dr. KASPER. No.

Mr. RITTER. Have you personally taken a look at it?

Dr. KASPER. I have read the document.

Mr. RITTER. You have read the document?

Dr. KASPER. Yes.

Mr. RITTER. As the head of the scientific committee, have you found, in terms of the various criteria of selection—are you satisfied that the process was completed along the lines that give you comfort that the scientific concerns were considered?

Dr. KASPER. I speak now, of course, only for myself, and not for the Academy; but it seems to me, in looking at the document, that the kinds of concerns that were considered by our committee in reviewing all 35 proposals were taken into account in the review of the seven finalists.

Mr. RITTER. Let me ask you a question. In the consideration by the committee of making a decision to narrow it to eight from 35, did you give a good deal of consideration to the immense, enormous scientific regional resources, human resources, of—for example—the Fermilab?

Dr. KASPER. Yes, we did. That was one among the items that we discussed when we went over the regional resources criteria.

Mr. RITTER. You said you have read the DOE final document. Have you noticed anything strange about the mention of regional resources on behalf of the Illinois proposal? Did it strike you as strange, anything in there, about either something that was written there or something that was not in there?

Dr. KASPER. I really do not recall.

Mr. RITTER. I do not think this relates to Mr. Walker's questions, because the process, to be the most credible, has to really be scientifically credible, at least acceptable.

As I read through the section on regional resources and the Illinois proposal, do you know the one existing mention—and I urge those of you who have this document here to turn to page 65—the one existing mention of Fermilab talks about their railroad siding. I kid you not.

In other words—you know, I am not from Illinois, and frankly, as the Chairman knows and everybody knows here, from the beginning I have questioned just the priority selection of the Superconducting Super Collider; but doesn't it strike you as passing strange that, in the regional resource consideration material in the DOE document, Fermilab was given credit only for having a railroad siding?

Dr. KASPER. It does, again, seem to me that these are questions that DOE would have to properly respond to. I do know how difficult it was when we put together our written document, to include enough in a short document that it gave an indication of the incredible amount of analysis and work that went into the decisions.

So I think the real question is whether, in making its decision, the Department of Energy actually considered the value of Fermilab.

Mr. RITTER. You know, it is not as if—if you blinked you would miss it on passing through—you know, in addition to the basic physical science reasons, wouldn't it occur to you as passing strange that the vast human resources, the people resources of that particular region, would be head-and-shoulders above that which competitive regions could offer, simply because of the existence of an infrastructure, a human resource infrastructure, that was far more significant? At least it should be mentioned, don't you think?

Dr. KASPER. I think that it might appropriately be mentioned. I can only tell you that, from the Academy committee's point of view, that was a matter of considerable discussion when we went to Illinois.

Mr. RITTER. I would agree with that. I can just imagine the discussions and deliberations taken part in by the committee really focusing on that as a very prime—but I guess what this calls into question in my own mind is, how could such an enormous feature of this selection landscape be absent, essentially completely absent, from the selection document? Are you familiar?

Dr. KASPER. I have no answer to that question.

Mr. RITTER. But I want to know, do you have any personal impression that this might perhaps have been an oversight, or that for some reason it did indeed belong in there? Do you believe it should have been in there?

Dr. KASPER. My personal feeling, which is only a guess here, is that it is inconceivable to me that this was not something that was considered by the Department of Energy in its decision-making. Whether it belongs—I guess I am more concerned about whether it was part of the decision-making than whether it appears in the document explicitly.

Chairman ROE. Would the gentleman yield for a moment?

Mr. PACKARD. Would the gentleman yield for a moment?

Mr. RITTER. In just a minute.

I would only say, if indeed it was significant, one would think that it would appear in the final document; but I yield to my colleague.

Mr. PACKARD. I think the greatest concern of all of the other states that were in the running, both before the final eight and after the final eight, was that the committees and those in the selection process would put too much weight on the existing facilities, rather than not enough.

I am convinced that it was not neglected or overlooked. Certainly, in our state, our concern was that there would be far more consideration given to the existing facilities than perhaps they deserved.

Mr. HALL. Mr. Chairman, would the gentleman yield further?

Mr. RITTER. Sure.

Mr. HALL. I think that the gentleman from Pennsylvania is probably more capable to ask more intelligent questions of the gentleman in the field of science than any other, being a chemist. And from the standpoint of levity, since I represent the state that was selected, I would be willing to stipulate that Fermilab had one of the finest railroad sidings in the entire country. [Laughter.]

And that would not be enough.

But I think it should be pointed out that the concern has been brought out here several times—I think that CERN is built under Lake Geneva; and I am sure that there were a lot of things that were taken into consideration, as the gentleman from California, Mr. Packard, has said, that are not noted here in this report.

I yield back. I just wanted to make that point.

Mr. RITTER. Just one last question. In that section on environment, I notice in the DOE report, the subject of fire ants was not considered. Did you, in your concerns about the environment—I

want to say that Texas does indeed have an outstanding environment—if you are in Waxahachie, do not try to dig too many holes in your bare feet, you know.

The fire ant situation was not mentioned at all. I look forward to listening to Professor Vinson. I do not purport to be an expert on fire ants, but from some of the things that we have heard, and the magazine articles that have been written, did you take this into account in your environmental considerations?

Dr. KASPER. To be honest, I do not recall discussions of fire ants.

Mr. RITTER. You are saying, in any environmental consideration, the fire ant question did not come up whatsoever?

Dr. KASPER. In the Academy.

Mr. RITTER. And we can ask DOE that question later on. Thank you, Mr. Chairman, I yield back my time.

Chairman ROE. I thank the gentleman for his most scholarly presentation. The thought occurred to me, with a little mirth, I am wondering whether, in building the Panama Canal, if they considered the mosquitoes at all. [Laughter.]

I think they did, and I think they compensated for them.

The Chair wants to thank the distinguished gentleman very much for his very, very articulate presentation, and the fair and equitable manner of his answers. I want to thank him very much. We thank him for being with us.

We have a couple of other questions; however, we will submit them to you in writing for further response from you, if you would be so kind.

The Chair now recognizes the distinguished gentleman, Robert Hunter, Director of the Office of Energy Research, to be accompanied by Mr. Wilmot Hess, Chairman of the Department of Energy Site Selection Task Force, as our next witnesses.

We changed the order somewhat, if the other witnesses will bear with us, because we dealt with the continuity. It was more appropriate to follow in this direction.

Having said all of that, the Chair welcomes our two distinguished witnesses. If we would hear first from Mr. Hunter, the Director of the Office of Energy Research. The Chair recognizes the distinguished gentleman.

STATEMENT OF DR. ROBERT O. HUNTER, JR., DIRECTOR, OFFICE OF ENERGY RESEARCH, DEPARTMENT OF ENERGY; ACCOMPANIED BY DR. WILMOT HESS, CHAIRMAN, DEPARTMENT OF ENERGY SSC SITE SELECTION TASK FORCE

Dr. HUNTER. Mr. Chairman, and members of the committee, it is my pleasure to appear before this committee to discuss the Department of Energy's FY 1990 request for the Superconducting Super Collider, and particularly the site selection process.

I have submitted written testimony to the record. With your permission, I would like to make some brief summary remarks.

Chairman ROE. No objection, so ordered.

How do the members feel about that? Do the members want to hear the full testimony? Would our case be better served by listening to the full testimony?

A summary is good enough? Okay, a summary is fine. The gentleman is requested to submit the full statement for the record, and the gentleman will proceed.

Dr. HUNTER. The site selection process that is the subject of today's hearing has been extremely important to the Department of Energy. We have had the honor of forwarding and representing the Superconducting Super Collider. The program is one of enormous value, both in the basic research knowledge it will provide, and for the technology benefits that will flow from its execution.

It has been conducted as a presidential initiative in both the Reagan and Bush Administrations, due to the value associated with the scientific merits, technological advances, and as an inspiration and tool for our youth and scientists and engineers.

It is the largest scientific instrument ever built, and is truly of national and international scope. Success and demonstration of our ability and leadership in this difficult task can only come from a collective and sustained effort.

In that effort, we must have a true partnership between industry and science, for it is a project beyond the capability of either alone. We must have a partnership between countries, for it is a truly international project. Above all else, we must have a common purpose with the people of this country; hence, the treatment and fairness extended to the states in the siting competition is very important.

I would like to comment on the value of the project, and to summarize our approach to the selection process. First, let me quote Dr. John Bardeen, a two-time Nobel Laureate now at the University of Illinois. Dr. Bardeen was associated with both the invention of the transistor and the basic theory of superconductors.[18]

I quote from an anthology entitled "Praising the Ring":

> The SSC represents a major advance in enabling us to learn more about the universe we live in. Since it makes use of superconductivity and other advanced technologies, what is learned in its construction and operation will have an important impact on introducing technologies for the future.

Second, I would like to quote G.W. Cronin, a professor of physics at the University of Chicago, in the same anthology:

> The proposed Superconducting Super Collider is the scientific imperative, if we are to answer the questions now raised by our current knowledge of microscopic particles and their interactions. The SSC is the necessary next step, if we wish to make further progress in our understanding of nature in its most microscopic form, the smallest objects, and in its most macroscopic form, the universe.

The Administration has chosen to make this project a major initiative because of its belief in the value of basic research, and particularly its long-term effect on science and education.

I have been involved since last August in the site selection process. The value of the project was understood by the States, and it has been an honor to see the vigor and excellence of the States' presentations and efforts. They have all had high-quality proposals, and have expended enormous efforts.

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[18] Dr. Bardeen shared the 1956 Nobel Prize for Physics for achievements in semiconductor studies and the invention of the electronic transistor. His contribution to superconductivity theory was honored by a share of the 1972 Nobel for Physics.

Every effort was made to assure the fairness and integrity of the process. A concerted effort was made to keep politics out of the process. I would repeat the quote of Secretary Herrington's: [19]

> I have run this on a non-political basis, first of all; and I think my integrity and record at the Department of Energy will carry forward.

The Department expended a sustained and substantial effort to reach a site selection decision, fully understanding the significance of its conduct. Debriefings, information released, and other associated matters have been conducted with a very high degree of openness, and we welcome your examination.

I am here today to answer any questions that you may have. I have brought for consideration and submission into the record the basic documents, which are referred to in my submitted testimony, that reflect the essential matters that we went through in the decision making process on the Site Task Force itself.

With that, let me leave those with you, and agree to answer any questions that you may have.

[The prepared statement of the Honorable Robert O. Hunter follows:]

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[19] The Honorable John Herrington, formerly Secretary of Energy.

Statement of Robert O. Hunter, Jr.

Director

Office of Energy Research

Department of Energy

before the

House Science, Space and Technology Committee

April 5, 1989

Mr. Chairman and Members of the Committee: I am pleased to be here today to describe the Superconducting Super Collider site selection process. Two existing facilities, the Stanford Linear Collider at the Stanford Linear Accelerator Center and the Tevatron at Fermi National Accelerator Laboratory, will keep the U.S. High Energy Physics program at the cutting edge of physics research for the next several years. But these facilities will not reach high enough energies to allow physicists to investigate the region where major breakthroughs are anticipated. The Superconducting Super Collider (SSC) is needed to advance the research frontier.

The SSC will consist of two rings of superconducting magnets and associated systems in a common tunnel, 53 miles in circumference. There will be four interaction regions where two beams of protons will collide head-on, making available a total of 40 trillion electron volts (TeV) of energy. These energies are expected to produce new types of matter and new forms of energy. Large detectors will be used in the interaction regions to detect and record these interactions. The SSC, through its investigation of fundamental physical processes, will provide new insights into questions of great significance to other sciences as well as to high energy physics. The Super Collider holds the potential for major, new breakthroughs in science and technology, and is expected to produce discoveries, innovations, and spin-offs that will profoundly touch every American.

Let me turn now to the site selection process. I will outline how the SSC Site Task Force (STF) conducted its review of proposals, how it evaluated this information, and how it arrived at its findings. I will also outline the development of the Environmental Impact Statement for the SSC. My

primary purpose will be to convey to you the consistency and fairness in the collection of data, its evaluation by the STF against the pre-established criteria and their relative importance and the development of cost estimates as set forth in the *Invitation for Site Proposals for the SSC (Invitation)*. I will also describe the unbiased nature of the rating process, the reporting of the STF's results, and the independence given to the STF to conduct its evaluation and determine its results without any outside influence.

The SSC site selection process, announced by Secretary of Energy John S. Herrington on February 10, 1987, was designed to enable a fair and open competition for states or other proposers wishing to host the SSC. The process called for the establishment of an SSC Site Task Force reporting to the Director of the Department of Energy's (DOE) Office of Energy Research.

The Task Force was formally organized on February 27, 1987, under the chairmanship of Dr. Wilmot N. Hess, Associate Director for the Office of High Energy and Nuclear Physics. Its members included senior Federal Government career personnel from the Office of Energy Research; Office of General Counsel; Assistant Secretary, Management and Administration; Assistant Secretary for Environment, Safety and Health; and the San Francisco Operations Office. In addition, the DOE's Chicago Operations Office provided substantial technical assistance and administrative support.

The Task Force developed the *Invitation*, which was issued on April 1, 1987, and solicited states and other interested parties to propose a site for construction and operation of the SSC. The *Invitation* described the

selection process, the qualification criteria for initial proposal screening, the technical criteria for evaluating proposals in detail, and the information required of proposers. It also provided a conceptual description of the SSC facility. The *Invitation* was developed with the objective of requesting the information and data necessary to fully evaluate proposed sites against the technical criteria. On April 29, 1987, a Preproposal Conference was held at the Departmental Auditorium in Washington, D.C. to outline the terms of the *Invitation*. More than 250 persons attended, and, following the Conference, responses to more than 750 questions concerning the *Invitation* were provided to potential proposers.

As stated in the *Invitation*, the goal of the site selection process was "...to select a site that will permit the highest level of research productivity and overall effectiveness of the SSC facility at a reasonable cost of construction and operation and with minimal adverse impact on the environment." The six technical evaluation criteria were: geology and tunneling, regional resources, environment, setting, regional conditions, and utilities. Subcriteria were developed for each of these. Although costs were also recognized as significant, primary emphasis was to be given to the technical evaluations. In order to conform with a provision titled "Administrative Provision" under the heading of "Department of Energy" in Chapter III, Title I of the Supplemental Appropriations Act, 1987, Public Law 100-71 (101 Stat. 404), the *Invitation* was amended on July 14, 1987, to provide that financial incentives offered by a proposer would not be considered in the selection of an SSC site.

PROPOSALS RECEIVED - ACADEMIES' COMMITTEE REVIEW

In response to the *Invitation*, the DOE received 43 proposals by September 2, 1987, the cutoff date. This date was extended from the original due date of August 3, 1987 (as specified in the *Invitation*), to give all proposers time to make their proposals consistent with the terms of the Domenici Amendment. These proposals were reviewed by the Task Force to determine if they met the five qualification criteria set forth in Section 3.2 of the *Invitation*. Seven proposals did not meet the basic qualification criteria and were disqualified. Thirty-six proposals, for sites in 25 states, met all of the DOE's qualification criteria. One proposal from New York, the Wallkill Valley site, was withdrawn by the proposer in October 1987, leaving 35 sites for evaluation.

The DOE had asked the National Academy of Sciences and the National Academy of Engineering to assist in the SSC site evaluation process by providing an independent evaluation of the qualified site proposals against the set of requirements in the *Invitation* and to recommend an unranked Best Qualified List (BQL) of sites. The Academies' assistance was sought in the interest of enlisting an independent evaluation that would further the goal of a credible and objective site selection process. On September 17, 1987, the DOE forwarded the qualified proposals to the Academies' Super Collider Site Evaluation Committee (Academies' Committee), which was composed of 21 members chosen on the basis of technical, professional, and managerial experience. The Task Force also supplied life-cycle cost estimates for each of the sites for the Academies' Committee consideration in their evaluation. The Academies' Committee formed seven working groups (one for each technical

evaluation criterion and one for the life-cycle cost category). Each working group was charged with providing an initial evaluation of each proposal for each subcriterion within their area of responsibility. These evaluations were used as a basis for presentation to and discussion by the full Committee. The Academies' Committee discussed the working group evaluations of the 35 proposals during its final meeting. The Chairman asked the full Committee to discuss each proposed site until a consensus was reached on whether it should be placed on the BQL. The BQL recommended by the Academies was not prioritized. The Committee did not predetermine an appropriate number of sites for the BQL. Geographic distribution was not a factor in the Committee's decision, nor did the Committee limit BQL sites to one per state. DOE did not play a role in the Academies' deliberations.

The Committee's report *Siting the Superconducting Super Collider*, which was forwarded to DOE on December 24, 1987, identified eight sites that "merited inclusion" on the BQL:

Arizona (Maricopa)
Colorado
Illinois
Michigan (Stockbridge)
New York (Rochester)
North Carolina
Tennessee
Texas (Dallas-Fort Worth)

The New York proposal was subsequently withdrawn by the proposer on January 15, 1988.

DETERMINATION OF BQL

The Task Force's technical/cost assessment of proposals began with the review to determine qualified proposals in September 1987. Following this review, and while the Academies' Committee was conducting its review, the Task Force was familiarizing itself with the 36 qualified proposals. To accomplish this, the Task Force assigned lead responsibility for each technical evaluation criterion and the life-cycle cost category to an individual Task Force member. In consultation with other Task Force members and advisors, each lead member assessed each proposal in his respective area of responsibility and reported his observations to the entire Task Force.

The DOE Task Force reviewed the Academies' Committee report for conformance with the technical evaluation criteria, subcriteria, and cost considerations in the *Invitation*, including their relative importance. DOE discussed the evaluation and supporting material with the Academies' staff to ensure they were sufficient to: 1) permit the DOE to accept the BQL; and 2) provide information for debriefing proposers not included on the BQL. After reviewing the report, meeting with the Academies' staff, and internal discussions, the Task Force unanimously recommended that the BQL be accepted without modification. The BQL was announced by Secretary of Energy Herrington on January 19, 1988, and consisted of the seven sites remaining on the Academies' recommended list.

EVALUATION OF BOL SITE PROPOSALS AND PREPARATION OF THE ENVIRONMENTAL IMPACT STATEMENT

The Task Force was responsible for managing two separate but parallel processes supporting the selection of an SSC site. These include a technical/cost evaluation as reported in SSC Site Evaluations: A Report by the SSC Site Task Force, November 1988, and an assessment of the potential environmental impacts of siting, constructing, and operating the SSC as reported in the SSC Final Environmental Impact Statement dated December 16, 1988. I will discuss both of these processes in greater detail below.

Staff discussions began in 1984 regarding the possible preparation of an EIS and continued through the completion of the SSC Conceptual Design Report (CDR) in 1986. At that point, the SSC site selection process was identified as a major Federal action requiring preparation of an Environmental Impact Statement (EIS).

The STF was given the responsibility, in February 1987, for completing an EIS on the siting, design, construction, and operation of the SSC. The Chicago Operations Office (CH) managed this effort as guided by the STF. DOE enlisted two contractors, Argonne National Laboratory in Chicago and the RTK Company in Oakland, CA, to assist in the planning and preparation of the EIS.

An Advanced Notice of Intent to prepare an EIS on the SSC was published in the *Federal Register* on May 4, 1987. Subsequently, an Implementation Plan was drafted which included a detailed outline for the EIS.

A Notice of Intent (NOI) to prepare the EIS on the SSC was published in the *Federal Register* on January 22, 1988. Following the issuance of this Notice, an intense environmental review of the BQL sites began.

In February 1988, the STF conducted EIS scoping meetings at each of the seven best qualified sites. The purpose of these meetings was to gain public input on the scope of the EIS and any major environmental issues that should be analyzed in the EIS. During February 1988, an announcement was made that the designation of the preferred site would be delayed from July 1988 to November 1988 to allow review of the comments expected to be submitted on the Draft Environmental Impact Statement.

Staff from RTK, accompanied by a DOE representative, conducted visits during January and February 1988 to each site to observe the site first hand, collect environmental information, and hold discussions with environmental experts and local officials. RTK also provided summary reports to the Task Force. Each BQL proposer provided additional environmental information during March 1988. Preliminary sections of the draft EIS were then prepared based on the proposals, supplemental data, and site visits. The Task Force visited each BQL site between April and July 1988. These Task Force visits permitted familiarization with the site and its vicinity and allowed members to meet with representatives of the proposer to clarify questions and remaining issues. At the end of each visit, questions were left with the proposer for response.

DOE's Notice of Availability for the Draft Environmental Impact Statement on the SSC was issued August 26, 1988. EPA's Notice of Availability was issued September 2, 1988, and marked the start of a 45-day public review and comment period which ended on October 17, 1988.

Public hearings to receive comments on the DEIS were held in early October near each of the BQL sites. Prior to issuing the DEIS, it was decided that a site-specific supplemental EIS (SEIS) would be prepared on the selected site prior to beginning construction. This SEIS will address environmental impacts from site-specific designs and mitigation measures for the construction and operation of the SSC. Effort is underway now on preparing the SEIS, and the Record of Decision for the supplement is scheduled for issuance in March 1990.

Responses were prepared to the approximately 7,000 comments received from 5,700 commentors. These comments and responses are provided in Volume II of the Final EIS. Changes were made to the DEIS based on these comments, DOE's responses and additional studies.

STF RATING PROCESS

In conducting the technical evaluation of each BQL site, the Task Force's committees reviewed all supplemental data, including that assembled for the preparation of the Environmental Impact Statement. They then prepared reports in their technical areas and made presentations to the full Task Force. Following committee presentations, intensive discussions were held by the Task Force as a whole to review committee findings. Within a given technical criterion, each subcriterion (e.g., for geology and tunneling the

subcriteria included geologic suitability, operational stability, operational efficiency, and construction risk) was discussed until a consensus was reached on the rating to be given to each proposal for that subcriterion. The ratings used were "outstanding," "good," "satisfactory," "poor," or "unsatisfactory." Once consensus was reached on the ratings for all subcriteria within a criterion, the Task Force discussed what the overall rating should be on that criterion.

Since subcriteria were listed in descending order of importance, adjectival ratings for the highest listed subcriterion had a greater impact on the overall criterion rating than any subcriterion ranked lower on the list. When consensus was reached on the overall criterion rating for all proposals, the Task Force proceeded to the next criterion.

At the September 18-25, 1988, meetings, the STF reached consensus on its ratings and produced the first elements of a draft STF report on the BQL sites. The deliberations generally took place as follows:

1. Each of the eight voting members of the STF was required to assign an adjectival rating (outstanding, good, satisfactory, poor, unsatisfactory) to each technical evaluation subcriterion and criterion for each BQL site and to list noteworthy strengths and weaknesses before discussion among the entire Site Task Force.

2. After these individual ratings were made, the entire Task Force discussed each subcriterion for each BQL site. The subcriteria under the geology and tunneling criterion were first, regional resources second, etc.

3. Discussion continued on each subcriterion until agreement was reached on the adjectival rating. When all subcriteria were rated, the Task Force discussions continued until agreement was reached on the overall rating for that criterion.

4. After consensus was reached on the ratings for all 19 subcriteria and six criteria for all of the BQL sites, all the ratings were reviewed again to determine if any STF member felt that a change was appropriate. In this concluding session, the STF confirmed its results, i.e., there were no changes in the ratings previously made to any criteria.

5. Life-cycle cost estimates for all of the BQL sites were reviewed by the STF and accepted. This included a discussion about what credit should be given for the Fermilab site included in the Illinois proposal.

Over the next few weeks, the STF turned its attention to finalizing its report on the BQL sites. This report was completed on November 4, 1988.

DESIGNATION OF THE PREFERRED SITE

The ratings, statements of strengths and weaknesses, and the entire text of the STF report on the BQL sites represents the unanimous views of the STF members. All of the deliberations of the STF were consistent with the terms of the *Invitation*. The STF's conclusions regarding ratings and its statements in the report were not influenced, edited, or reviewed by any political or appointed officials of DOE management. The Energy System Acquisition Advisory Board (ESAAB) (the ESAAB is a group of senior DOE

management officials charged with reviewing major DOE projects) and the Secretary were first provided with the results of the STF's findings in briefings and were given the STF's report on November 8, 1988.

These briefings included a summary of both the Draft EIS and the comments received on the Draft EIS, prepared by the contractor, RTK. The STF reported that STF members had personally reviewed, as of November 3, 1988, the summary of comments prepared by RTK and approximately 3,000 responses to these comments. At that point, the total number of comments estimated to require a response numbered approximately 5,300. The STF reported that it believed that the 3,000 responses to comments that its members had reviewed to date were representative of all the comments received and summarized by RTK.

To assure that public comments were taken into account in identification of a preferred site, each Task Force member was asked to determine:

- If the DEIS comment summary identified any issues that had not been investigated and considered in developing the adjectival ratings of the sites.

- If there were new issues raised in the comments, what effect, if any, would the issue(s) have on the STF's technical ratings of the sites.

- Would any comments on the DEIS affect the life cycle cost estimate enough to change the overall estimate when rounded to the nearest $100 million.

In addition, the Task Force member with lead responsibility for the environment criterion reviewed the additional field studies on wetlands and threatened and endangered species as well as the comments from the Environmental Protection Agency (EPA). The Task Force reported that it believed that all major issues raised by the public and identified in the additional field studies had been appropriately considered. The Task Force found that none of this information would justify a change in the technical evaluation ratings or life-cycle cost estimates as reported in the SSC Site Task Force Report of November 1988.

The ESAAB determined that the Site Task Force had conducted its evaluation consistent with the terms of the *Invitation* and had performed a comprehensive and credible review of the best qualified list of sites. This assessment was provided to the Secretary of Energy and considered by him in reaching a decision on the designation of the preferred site. The preferred site designation was made on November 10, 1988. In his statement, Secretary Herrington noted that his selection of Texas as the preferred site was based on the STF's report, the draft SSC Environmental Impact Statement and comments on the draft, and his meetings with each of the proposers on the BQL. (These meetings took place in early October 1988.)

Debriefings were subsequently provided to each of the BQL proposers by the STF. These debriefings took place during the period of December 5 through December 19, 1988. Several questions were raised by the BQL proposers. Oral responses were given at the debriefings, followed by written responses.

FINAL SITE SELECTION

On December 16, 1988, EPA's Notice of Availability regarding the Final Environmental Impact Statement for the SSC was published in the *Federal Register*. On January 17, 1989, the STF submitted a report to the ESAAB which included:

- a statement of the key differences between the draft EIS and the final EIS,
- a summary of the principal findings of the final EIS,
- an identification of the key differences between results reported in the SSC Site Evaluations Report and the final EIS, and
- information concerning the comments that had been received on the final EIS.

The STF concluded that the final EIS provided a complete and adequate basis for the Secretary to consider in reaching a final site selection decision for the SSC. While there are some differences between the STF's technical evaluation and the final EIS, the Secretary did not consider these differences significant enough to require alteration to the adjectival ratings contained in the STF site evaluations report.

The Record of Decision deciding to proceed with the SSC, and selecting Texas as the site, was signed on January 18, 1989, by Secretary Herrington after a review of the final EIS.

SUMMARY

To summarize, the SSC STF conducted an unbiased evaluation of the merits of each of the BQL sites against the published evaluation criteria and their relative importance. The membership of the STF was composed exclusively of DOE career employees. None of the members of the STF had any interest in seeing a particular site selected. The STF also dealt consistently and fairly with each of the BQL sites in a way that has enabled a fair and open competitive process.

As evidence of the openness of the SSC site selection process, the STF has released to the public all information relevant to its technical findings and cost estimates for the BQL sites. This is an extensive amount of material and includes:

- o Siting the Superconducting Super Collider, December 1987
- o Best Qualified Sites for the Superconducting Super Collider, January 1988
- o RTK Site Visit Report, April 12, 1988
- o SSC Site Evaluation Reports, September 1988
  - STF Geology and Tunneling Subcommittee Report
  - STF Regional Resources Subcommittee Report
  - STF Environment Subcommittee Report
  - STF Setting Subcommittee Report
  - STF Regional Conditions Subcommittee Report
  - STF Utilities Subcommittee Report
- o Review of A. T. Kearney Study on "Siting the Superconducting Super Collider at Fermilab," October 21, 1988
- o SSC Site Task Force Summary Review of Comments on the Draft EIS for the SSC, November 3, 1988
- o SSC Site Evaluations: A Report by the SSC Site Task Force, November 1988

- Selection of the Preferred Site for the Superconducting Super Collider, November 10, 1988
- RTK, Superconducting Super Collider, Gross Life Cycle Cost Analyses of BQL Sites, November 1988, DRAFT
- Letters to 7 BQL proposers responding to questions from their debriefings, January 13, 1989
- Summary Assessment of the SSC Final Environmental Impact Statement, January 17, 1989
- Department of Energy Record of Decision: Superconducting Super Collider, January 18, 1989

I feel that this description of the SSC site evaluation process demonstrates that DOE has taken every reasonable step to insure that the process was open, above-board, and consistent with the terms of the *Invitation*.

That concludes my statement. I would be pleased to answer questions.

U.S. Department of Energy
Assistant Secretary for
Congressional, Intergovernmental
and Public Affairs
Office of Public Liaison
Washington, D.C. 20585
202/586-4292

BIOGRAPHY

ROBERT O. HUNTER, JR.

Robert O. Hunter, Jr., was nominated by President Reagan to be Director of the Office of Energy Research, U.S. Department of Energy (DOE) on May 25, 1988. Mr. Hunter was confirmed by the United States Senate on August 11, and sworn into office on August 18, 1988.

In this position, Mr. Hunter serves as technical adviser to the Secretary on the Department's energy research and development programs and is responsible for the oversight of several single and multipurpose national laboratories, and energy education and training activities. In addition, he manages DOE's programs for basic energy research, health and environmental research, high energy and nuclear physics, and magnetic fusion.

Prior to joining DOE, Mr. Hunter was the President of the Western Research Corporation in San Diego, California, since 1978. He served as a member of the White House Science Council from 1982 to 1985, and between 1973 and 1978 he was a staff scientist at Maxwell Laboratories. He has worked primarily in the areas of laser physics, optical physics, and electrical engineering.

A native of Riverside, California, Mr. Hunter received his B.S. degree in physics from Stanford University in 1967, and his Ph.D. degree in physics from the University of California, Irvine, in 1981. He served in the United States Air Force from 1967 to 1972.

Mr. Hunter is married to the former Becky Vasiliki and they have three children.

August 1988

Mr. VOLKMER [presiding]. Thank you. We will now begin our questioning with the gentleman from Pennsylvania, Mr. Walker.

Mr. WALKER. Thank you, Mr. Chairman. First of all, I want to welcome Mr. Hunter here. He is a brother of one of our distinguished colleagues. We welcome you here. I also know you are a distinguished scientist.

I think you heard my line of questioning to Dr. Kasper of the Academy of Sciences. My concern is that, when all is said and done, the science community was not the ultimate arbitrator in the final selection. This is something of major significance, in terms of the science budget.

Would you comment on that for me, please?

Dr. HUNTER. Certainly. Let me comment on it from three aspects: one, the historical example; secondly, the mechanisms that we have for involving the scientific community in the basic decision on the super collider; thirdly, with regard to the relevance and involvement on specific evaluation activities that we undertook.

The process that was followed roughly follows the historic example that was set in the selection of Fermilab as a site. There, in the end, at the generation of the Department—it made the selection of the site.

So I think that insofar as the responsibility of the mission of the agency to make the final selection of the site—and again, in accordance with procedures that have been outlined and opened up for discussion—the many external parties have this historic precedent. I think it worked quite well in that case.

Mr. WALKER. Let me just interrupt you there. In the case of Fermi, was the same pattern followed, that there was no recommendation from the science community about the site?

Dr. HUNTER. I believe in that case there was a rough equivalence. I will be happy to submit to you the details. It was not a precise replication of that procedure, if you will; but I will be happy to submit to you, for the record, the details of how that was carried out.

[The information follows:]

The general features of the Fermilab and SSC site selection processes were the same. Both processes were initiated by a public call for proposals and publication of site requirements by the agency, Atomic Energy Commission (AEC) for Fermilab and DOE for SSC. In both cases the proposals were subjected to initial screening by the agency to identify those proposals that met basic qualification criteria. The qualified proposals for Fermilab then were submitted to a National Academy of Sciences committee for further evaluation and those for SSC to a committee of the National Academy of Sciences and National Academy of Engineering. In both cases the Academies provided the agency with a short unranked list of sites that were considered excellent. The final selection was made after further evaluation by the Agency in both cases. There were a few differences in detail. In the Fermilab case, AEC staff visited all sites evaluated by the Academy and made their trip reports available to the Academy prior to completion of its short list; and, there were no National Environmental Policy Act requirements in 1965–1966 because the law was not enacted until 1970.

Dr. HUNTER. The essential point was that the mission agency in the end was responsible for the site decision.

Mr. WALKER. I am not quarreling with that at all, because I agree with Dr. Kasper that, in the final analysis, there is more to this than a simple scientific judgment. What I am concerned with is that the scientific judgment rested only with picking out eight

sites that were suitable and that after that there was little input from the scientific community in the matter of site selection.

It seems to me that that judgment should have been given more substance. But I would be interested in seeing that which was done in the case of Fermilab, because it was my impression that this was somewhat different from that site selection process.

Dr. HUNTER. Let me speak to that again, the second point, which is the issue of how, in general, the scientific community is involved in a decision of this nature. The decision of the Reagan and Bush Administrations to pursue this particular project at such a high priority is, of course, based on their view of the value of this project to basic research, and what it means for the long-term future of the country.

That is only arrived at in close consultation and involvement through a very large number of channels with the scientific community. Particularly in cases that I was directly involved in, the advisory panel to the White House, the science council in the early 1980's, without a single particle physicist on the membership, discussed this at some length, and felt that it was appropriate to proceed.

Dr. Trivelpiece, my predecessor at the Department of Energy, who was one of the foremost advocates, was a plasma physicist. Dr. Keyworth, who championed it, was a person with a background in nuclear physics and high-energy physics. Many people of different scientific backgrounds, both in the Administration and, particularly, outside, have commented on the value of this project and have been involved in discussions of it.

With regard to the high-energy physics community itself and what this means for the future, beginning in 1982 and 1983, they looked very closely at the alternatives in front of them, and essentially elected to go forward with the SSC as the way to retain American leadership, to gain and retain American leadership in high-energy physics. They have pursued that single-mindedly through that period of time, as the number one priority.

As of February of this year, there was a report released by our High-Energy Physics Advisory Panel [20] which basically reiterated their support of the SSC as the most important activity, and also looked at the question of how to involve larger segments of the scientific and technical communities in the activities.

So I think there are a number of avenues and channels for the involvement of the different groups. Certainly, the National Academy of Sciences here has been one in this process, as it goes forward. Certainly, the Congress will not make a decision on the merits of this without careful examination of its scientific value, and, in the end, the value of supporting this line of basic research for the future of the country.

So I think there are many avenues, only a few of which I have touched on, that have been considered with regard to the involvement of other communities and things of that nature.

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[20] "Report of the HEPAP Subpanel on High Energy Physics and the SSC Over the Next Decade," High Energy Physics Advisory Panel, Office of Energy Research, U.S. Department of Energy (DOE/ER-0408), February 1989.

The third point is the issue of specific involvement, which Dr. Kasper mentioned as well. That is, when you have it narrowed down to where you have the criteria established by an interaction involving the public, communities—this Committee for example—the Congress, and the rest of the Administration—when you have that narrowed down and put out in front of people, and you have a number of proposers, the question is, how best do you proceed through this large-scale task that you have people spend a great deal of time on and become a little re-immersed in the process? How do you evaluate the enormous amount of material that you have?

The amount of material submitted in the proposal alone was voluminous. The Department of Energy, in the end, expended close to 200,000 man-hours on this project. In other words, it was a very intense, involved process, in which people had to be immersed full-time for a very long period of time.

The National Academy of Sciences' activity, those people, as you stated, were drawn from arenas where they were otherwise occupied. So I strongly support the decision made previously to leave this in the hands of professional personnel, to be guided by and have them supported by people in high-energy physics and others.

I would add, as we went through this, for example, on the issue of the use of the Tevatron [21] as an injector, a panel of physicists was commissioned under the directorship of Mr. Frieman, and was able to comment as to whether or not the Tevatron could serve usefully as an injector, and what sort of upgrades would be required to do that, and to assign costs to that.

In the areas that particularly involved scientific judgments, the appropriate scientific communities were involved.

Another comment I would make is that Dr. Hess, here, who was the head of the Site Task Force activity, is also the head of the High-Energy Physics Program in the Department of Energy, and regularly, and on a very widespread basis, interacts with that community.

We brought in groups as appropriate. It was structured to be handled by the professional personnel in the Department. It was particularly set up to avoid any possibility of political interference, or appearance of it.

So I think, once you talk in great detail of this enormous amount of information, you had to thoroughly evaluate it. You had the criteria established, and you had the original list set up. I think the way it was handled was entirely appropriate.

Mr. WALKER. I thank you, and I realize that I am over time. Let me just pursue one more thing. Two hundred thousand hours of Department of Energy time were done in site selection?

Dr. HUNTER. Approximately, and the EIS.

Mr. WALKER. I did some rough calculations here, but if the 21 people on the Committee worked for 90 days, worked every day for 90 days, and spent 10 hours a day at it, that would mean that they would spend 18,900 hours, which is less than 10 percent of the time spent by the Department of Energy in site selection.

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[21] The Tevatron is the major instrument at the Fermi National Accelerator Laboratory. The Tevatron operates at an energy level of 0.9 trillion electron volts per particle beam.

In other words, science was given less than 10 percent of the pie out of all of this. Therein lies my concern.

Dr. HUNTER. Excuse me. The activities of the Department lasted a much more extended period of time than that which you referred to.

Mr. WALKER. I understand. But, they were circumscribed in the 90 days. They did intensive work during that period of time, and so science gets less than 10 percent of the evaluation procedure that ultimately ended up in a site-selection process.

That's where some of our concerns are.

Dr. HUNTER. Again, let me comment. For example, in the case of Dr. Frieman and those people, they were involved directly through the National Academy of Sciences.

So the point is, in specific areas where their expertise was required, they were involved during the course of that activity.

Mr. WALKER. Thank you, Mr. Chairman.

Chairman ROE [presiding]. I thank the distinguished gentleman from Pennsylvania. Let me ask some questions. I think that the tenor of some of the questioning seems to go in the direction:

Should the scientific community have had more to say about the location, per se?

That's my hearing. That's what I'm hearing. Having said that, in your judgment, was the location decision a scientific decision in the first place?

Mr. HUNTER. Could I ask you to clarify that, Mr. Chairman?

Chairman ROE. Our last witness made the point that when the Academies did their research work and their review work of the criteria established by DOE, they determined that there were eight, now seven, sites that, in their judgment, according to the testimony, would have made excellent sites for the location of the Superconductor Super Collider. That is what we heard from the Academy.

Is that fair? I'm asking you specifically in order to clarify this issue whether it's a public works job or not a public works job.

Maybe that's what it really is, in fact. It is a public works job, with the exception of the intricacies of the machinery. It's like our building a great big dam, and so forth, and the control mechanism is what controls the dam. That's the scientific aspect. It's still public works.

So, anybody who doesn't recognize the Superconductor Super Collider as being 90 percent a public works process doesn't understand the issue. That's number one, because you have to locate it some place.

The second point is the intricacies of the machinery and the equipment contained therein. I think that's a reasonable approach.

Question: In your judgment, was the location decision, by its nature, a scientific decision? Did the nation lose something by not having selected one of the other sites from a scientific point of view?

Dr. HUNTER. No, sir, it did not. In my opinion, it was the right decision. I would point out that the scientists who came in with the individual States—such as Dr. Cronin, you know—came in and made their arguments quite eloquently, the opinions they had on

where it should be sited, that is, the scientists associated with particular locations were given their chance for a hearing.

So I think that, in terms of the evaluation, the reason the criteria were set up was to make sure that this basically was the best site for the country, the best of the best, in an overall sense. And I fully support the decision.

Chairman ROE. Let me ask the second part of the question. In your judgment, has the scientific integrity of the Superconductor Super Collider, the end result we wish to achieve scientifically, been compromised in any way by the selection of the site that has been selected, to your knowledge?

Dr. HUNTER. No, sir, not at all.

Chairman ROE. The Chair recognizes the distinguished gentleman from Pennsylvania, Mr. Ritter.

Mr. RITTER. Thank you, Mr. Chairman.

Chairman ROE. I wanted to get you up early so I didn't forget you the next time.

Mr. RITTER. You mentioned—by the way, I also want to welcome my friend, Mr. Hunter, to the witness table. And I want to point out to my colleagues that the man at the witness table is an extraordinarily competent person and DOE has somebody—although it's somebody who I fear I don't agree with on the basic premise of the Superconducting Super Collider—somebody who is eminently qualified to carry out DOE's role, if, indeed, the super collider is going to be built.

It was mentioned that $200,000 would be spent on this site selection EIS. That's an enormous amount of time. How much of that time actually was devoted to the Environmental Impact Statement?

Dr. HUNTER. I can't give you an exact account, but I would say a very substantial fraction was—the environmental impact process that I was introduced to in the Department there is very complicated, and the Site Task Force was really involved and oversaw itself two separate activities.

Those two activities were the Environmental Impact Statement preparation, that process, and secondly, the site selection process itself. Those were carried forth as separate activities. Both the responsibility of the Site Task Force—it's hard to untangle them because, in some cases, there was common data used for both of them.

Mr. RITTER. I can appreciate that. And if you look at where Mr. Skaggs is sitting, that is the Environmental Impact Statement, plus the comments.

I take it that the Environmental Impact Statement itself is on the order of three to four inches thick. One paragraph out of those three to four inches focused on the problem of the fire ants. And, in reading that paragraph, it talks about what could be a nasty environmental problem. But it doesn't really say anything about what would be done about that problem other than it would be addressed, that a strategy would be evolved.

It seems to me that the problem is significant and, yet, the amount of effort spent on it—one paragraph approximately two and a half inches long, closely-spaced typewritten material. Out of

that kind of material, that's rather inconsequential attention to what could be a biting concern. [Laughter.]

Do you want to comment on your own of the magnitude of the fire ant problem?

I know we're going to have a professor to testify on this later.

Dr. HUNTER. Yes, let me comment briefly. I would say that one purpose of the Environmental Impact Statement, a major purpose, is to protect the species that exist locally. [Laughter.]

When you ask about the Environmental Impact Statement, the fire ants and the consequences of the construction, they are really somewhat different matters; where they come in is, do they pose a hazard, for example, to the personnel associated with the project?

Mr. RITTER. Or to the electrical system.

Dr. HUNTER. We had discussions, and they were significant during the final evaluating process.

The fire ants were brought up. We had personnel who had specific experience in the areas involved, and we feel that we were able to form a reasonable judgment as to their value.

But, don't mistake the fact that it's such a small fraction of the EIS that is related to the fire ants, to that being our whole consideration and background with regard to their impact on the project.

Mr. RITTER. If I might, looking at the environment section of the Texas proposal, I look at the sub-heading, Environmental Impacts and Weaknesses, and I read:

> One important riparian floodway may be impacted. Project use of groundwater resources would contribute to existing overdraft condition; land acquisition would require 175 relocations. There is the potential for socioeconomic impact.

If, in your own words, saying that the fire ant problem is significant, why is it not in the summary?

Dr. HUNTER. Excuse me. The comment I made was that it was discussed and afforded attention beyond the level you might believe from the amount it occupies, in the amount in the document in the EIS.

Basically, the feeling at the time was that with regard to human safety, the fire ants, because they are in areas where people have lived and worked for many years and constructed objects, that the fire ants could be dealt with in a reasonably straightforward fashion.

Now, let me proceed here a little bit. The specific major concern about the fire ants, that I saw in the comments, was that fire ants would attack the apparatus in the machine.

And the concern was that they would come down, that they would in some way get into the hallways of the accelerator and they would then disable the machinery.

It was a further concern that even if we put alarms in, in the one document that I saw, that the fire ants would be able to disable the alarms.

And so what you see in the EIS is we were responding directly to the comments. And in going through the NEPA [22] process, you respond directly to the concerns that, specifically, people express.

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[22] National Environmental Policy Act of 1969.

So that has to do with the volume and nature of the response in the EIS. But having had the issue brought up again, we did have access to people who had worked in the area. They had knowledge of the construction and the impacts that are brought forth, and also considered the issue of what it would mean in terms of human safety.

That is, could we with relative ease put safeguards in place to ensure that people would not be endangered during the course of the construction?

Mr. RITTER. The bottom line, though, is that this fire ant problem was not considered significant enough to impact on an outstanding rating that Texas received.

Dr. HUNTER. This is in the environment category?

Mr. RITTER. Yes, in the environment category. We're not saying the rating was given by the Academy. They didn't even consider the fire ants, obviously. You did.

Dr. HUNTER. From the comments I heard and the discussions about this, I was not directly involved. I'm not a fire ant expert.

Mr. RITTER. Neither am I.

Dr. HUNTER. One was that the tunnel was at some depth, approximately 200 feet, in pretty solid chalk, and the fire ants would have trouble tunneling down into the tunnel. One.

Two, that people were able to involve safeguards to keep them out of areas, and so forth.

So the particular issues that arose, they were considered, in that kind of fashion, after it was brought to our attention and not only with regard to the impact in the environmental sense. And our conclusion at the time was that we could go forward. It would not be a major impact.

Mr. RITTER. And you felt there was not sufficient weakness in order to be characterized as a weakness in the DOE's site selection?

Dr. HUNTER. That's correct.

Mr. RITTER. One last point. The lack of mention of the Fermilab as a regional resource, you heard the discussion. Is that simply a drafting error?

Dr. HUNTER. Let me make a couple of comments here. I just leafed through this section. As you described it earlier, they did receive an outstanding rating. If you look at the language associated with that, full credit was given to the very outstanding resources that are in the area.

I can assure you from my involvement in the briefings of the States, particularly the Illinois briefing, by the great deal of consideration given in the cost areas to the Illinois issue, and the Fermilab, that a great deal of attention was placed on Fermilab.

We, the Department of Energy, are almost uniquely aware in the Government of the value of Fermilab. Dr. Hess, who is the head of the Site Task Force, oversees the Fermilab operation, and we are extremely proud of the way in which he's carried out the resources around that area and a scientific and cultural atmosphere in which he conducts his business.

So we were aware of all of those issues they did have and they were placed directly before the Secretary in briefings to him.

Those same kinds of considerations—Dr. Cronin, I believe, made verbally those same comments that were made in the letter about

the contrast between the European type of operation and another type of operation and the ease with which you could expand up from that.

So I can assure you that the Fermilab was considered in all those various lights. I believe that the rating that you're referring to, we failed to mention their name appropriately. Believe me, it was not intended that attribution had to do with the fact that there was a railroad siding there.

We were very aware of the enormous resource it represents and are very proud of that facility supported by energy research and the high-energy physics group.

Mr. RITTER. Thank you, Mr. Chairman. I yield back and I await the next chapter in what might be termed the Invasion of the Fire Ants. It reminds me of a short story that we read when we were kids about somebody who made it through this plantation through a sea of red ants with a leather suit and somehow, before expiring, he made it to the other side.

So there is hope yet. Thank you, Mr. Chairman.

Chairman ROE. Is that section of Texas inhabited at all?

Dr. HUNTER. Where there are fire ants? Yes, sir.

Chairman ROE. Are there any cities in the area?

Dr. HUNTER. I believe they're fairly widespread in Texas.

Chairman ROE. Dallas/Fort Worth, I'm told. [Laughter.]

Mr. Skaggs from Colorado is recognized.

Mr. SKAGGS. Thank you, Mr. Chairman.

Dr. Hunter, from our exchange of correspondence, I believe you're aware of my concern about the Department's decision to mail the full EIS first-class postage to something like 17,000 individuals around this country, and spend close to a million and a half dollars in the process.

In your response to me, you, among other things, cited the regulations under the National Environmental Policy Act. I've taken a look at those. One comment there, and I quote, is that:

"The purpose of the regulations is not to generate paperwork, even excellent paperwork, but to foster excellent action."

What concerns me especially is that, in your response to my inquiry on this, you essentially defended the Department's action on this rather than just admitting that it was a mistake and indicating what action you would take to prevent it in the future.

That still concerns me. I would like to ask your response now.

[The original letter from Dr. Hunter to Mr. Skaggs follows:]

Department of Energy
Washington, DC 20585

JAN 17 1989

Honorable David E. Skaggs
House of Representatives
Washington, DC 20515

Dear Mr. Skaggs:

Thank you for your letter of December 19, 1988, expressing concern over the size of the Department of Energy (DOE) Superconducting Super Collider (SSC) final Environmental Impact Statement (EIS) and the cost of printing and distributing the document.

We regret any inconvenience caused by the physical size of this EIS. DOE has conducted the process in an open and public manner, as required by the National Environmental Policy Act (NEPA). Consequently, a large number of comments were received from a large number of participants in the process. The final EIS was sent to those persons who participated in the process, in part, so that they would be aware that their views were considered. If DOE erred, it was in not editing its mailing lists sufficiently to avoid duplication of mailings, but I can assure you that the error was an honest one and we were merely trying to be as communicative as is possible.

Environmental impact statements are prepared under the regulations of the President's Council on Environmental Quality (CEQ) found at 40 CFR Parts 1500-1508. These regulations require Federal agencies to present the environmental impacts of a proposal and the alternatives in comparative form (40 CFR 1502.14). Due to the potential environmental impacts of a project the magnitude of the SSC and the need to address and compare these impacts at each of seven alterative sites, the EIS was voluminous.

In addition, approximately 5,700 written and oral comments were received on the draft EIS. These comments covered a variety of issues at each of the seven sites as well as topics related to the SSC in general. DOE was required to address and consider all comments received on both an individual and collective basis (40 CFR 1503.4), and to make the comments and responses publicly available. Much of the volume of the final SSC EIS consists of reproduction of these public comments and DOE's response thereto.

While the inconvenience of the distribution to a number of individuals who did not want the complete text of the final EIS is regretted, DOE was required by the CEQ regulations to furnish the final EIS to "any person, organization, or agency which submitted substantive comments on the draft" (40 CFR 1502.19). Because of the large number of such comments received,

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the distribution of the final EIS was unusually broad. An attempt was made to avoid duplicative distribution to the same individual, but the Department could not assume that individuals at the same mailing address necessarily make up a household, and we plan in the future to take steps to scrutinize our mailing lists carefully.

The Department's distribution of the final EIS was consistent with normal Federal agency practice. It included the applicant States, appropriate Federal, State, and local agencies, landowners who would be affected, libraries, interested media, individuals who requested copies of the final EIS, and those who commented on the draft EIS.

Sincerely,

Robert O. Hunter, Jr.

Robert O. Hunter, Jr.
Director
Office of Energy Research

Dr. HUNTER. Certainly. Let me break that into two parts for consideration as to why it was done that way. And secondly, what we're doing in the future to ensure it does not recur.

The document under which we were operating and the various decisions that were taken in conjunction with the discussion with our staff from the environmental and health groups in the Department associated with this activity, and also with the General Counsel's Office, the basic issue is laid out in the CEQ [23] regulation that applies to this.

That same regulation does contain a section on the reduction of paperwork. In other words, it's an issue that the regulation does address.

What we faced was that there was a requirement in there, 40 CFR 1502.19(b) [24] that basically requires Federal agencies to furnish the entire final EIS to any person, organization or agency which submitted substantive comments on the draft.

Now, the determination we made was not to declare any comments, if you will, or not to lightly declare any comments nonsubstantive. And we can certainly in the future, you know, look at how to characterize the comments.

So, you know, that we would have to respond or have to mail the comments back with the EIS to fewer numbers of people.

But, in this activity, we chose to handle it this way. Secondly, in terms—that's sending it to the people. In terms of the volume of it, there are options called for in there. One is that you can try to summarize the comments and condense them. That is, the agency itself can apply its resources towards trying to reduce the comments, summary sections, as opposed to sending the full comments back.

And we chose at the time in the interest of accuracy not to try to summarize or represent the comments by the parties.

Now, the issues of the mailing list was based on what I've outlined to you. In the future, we are doing an SEIS,[25] which I believe is due out in June 1990 on the site-specific part. And we're going to go to lengths to make sure that we have a mailing list where the people are informed well ahead of time what they might receive.

They are provided with an opportunity not to choose to receive it. We will undertake those types of activities and, as well, will try to ensure that the total volume is kept well down at a small number of pages.

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[23] Council on Environmental Quality, Executive Office of the President.

[24] 40 CFR 1502.19 states as follows: "Agencies shall circulate the entire draft and final environmental impact statements except for certain appendices as provided in § 1502.18(d) and unchanged statements as provided in § 1503.4(c). However, if the statement is unusually long, the agency may circulate the summary instead, except that the entire statement shall be furnished to:

(a) Any Federal agency which has jurisdiction by law or special expertise with respect to any environmental impact involved and any appropriate Federal, State or local agency authorized to develop and enforce environmental standards.

(b) The applicant, if any.

(c) Any person, organization, or agency requesting the entire environmental impact statement.

(d) In the case of a final environmental impact statement any person, organization, or agency which submitted substantive comments on the draft.

If the agency circulates the summary and thereafter receives a timely request for the entire statement and for additional time to comment, the time for that requestor only shall be extended by at least 15 days beyond the minimum period."

[25] Supplementary Environmental Impact Statement.

And those we commit to you to undertake.

Mr. SKAGGS. It sounds as though you are still going to read—unnecessarily broadly, in my judgment—the requirement that the full EIS be sent to someone among other categories that makes a substantive comment.

Now, let me just read one letter from the materials in the EIS, from a Steven Oglesby:

DEAR SECRETARY HERRINGTON. I would love to have the SSC in Ennis. It will bring many jobs to Ennis that will rule the town. I would love to see Ennis grow and have a fantastic science community. Please bring it here. Illinois wouldn't know what to do with it. Thank you.

Do you consider that a substantive comment?

Dr. HUNTER. As I said, we could undertake a course of screening out substantive comments. In this case, we did not do that both due to the fact that there was such public interest—there were seven sites where we had to look at each one, you know, in the totality of the exercise. It was an unusually large number of sites.

We chose to handle it that way.

Let me say that the production of that document, the cross-referencing, the consistency checks and things of that sort, represented an enormous, intense effort on our part.

We will be happy to try to reduce the mailings and the size of the documents. But, simply put, those were the reasons that we decided to handle it as we did. And that's what occurred. We will take the specific steps I've represented to you on the SEIS. And we recommended that they be looked at in the Department, as well, to bring in such a large and total response in the future.

Dr. SKAGGS. Do you believe you made a mistake in handling this the way you did for the final EIS?

Mr. HUNTER. That's a question, sir, that you answer in reference; at the time I looked at the CEQ, I asked the people "Are we required to send this to everybody? What are the pluses and minuses of summarizing it, for example?"

One thing you have to understand is that we had a group working on the EIS in this activity that was substantial in size and costing the Government money by going forward with it.

Mr. SKAGGS. Just right now, this afternoon, do you believe that there was an error in judgment in handling this the way you did?

Dr. HUNTER. Certainly, if the object of the EIS is to inculcate in people's minds that they are having a free and open exchange and the Federal Government is taking care of their concerns properly, then we may certainly have erred.

Mr. SKAGGS. I think it's very important if we're going to be successful—and I know some people see this as a side issue, and maybe it is—but the fundamental question here is whether we're going to be able to convince our colleagues around this place that this is going to be a program that is tightly managed, that the billions of dollars that are going to be involved in this will be scrutinized as carefully as possible, and that we're not going to get a kind of defensive bureaucratic response to what I think are some very straightforward questions about this.

I'm still hearing largely a defensive response from you, rather than saying we're going to do better in the future. I think it has

implications not just for how you're going to handle the next EIS, but the perception about how this program is going to be managed.

Thank you, Mr. Chairman.

Chairman ROE. I thank the gentleman from Colorado.

The Chair recognizes the distinguished gentleman from Illinois, Mr. Fawell.

Mr. FAWELL. Thank you, Mr. Chairman.

I don't want to tread over a lot of ground that I've already marched across several times. But, in reference to the question that Illinois has submitted for the record, their reaction, which does include a lot of what can be called, depending on the observer's view, some relatively small evidences, which, from their viewpoint, does indicate perhaps that Illinois' story was somewhat neglected.

So I could go over a number of instances and it would serve no purpose whatsoever. I want to again emphasize the fact that I speak as one who is in favor of the SSC. This is something that our nation ought to be committed to.

We certainly limit a lot in all that we do. And in reference, Mr. Hunter, to your comments, for instance, that we not have anything that even looked political, I just might submit that I think from the viewpoint of most of the States, there are evidences which lead us to that conclusion.

Just, for instance, in regard to the findings in reference to climate, Illinois is not very good. You noted the 30 inches of snow in Texas. Nothing was mentioned about the humidity and nothing about the fire ant.

I recall at the debriefing that reference was made to the site task force, which has spent two years of work, a great deal of study, I specifically asked the question: Was the Secretary, Mr. Herrington, involved so that he was aware of the details, and so forth?

And they said that, no, he was not aware of the site task force. He was not involved in those detailed determinations.

Yet, the final decision was the evaluation report. This particular report was turned over, as I recall, to Mr. Herrington in November on Election Day and then, two days later, the morning of November 10th, the decision was announced by Mr. Herrington, who, God knows, could not possibly have been able to assimilate in that period of time.

That has the perception—I mean, I would suggest it couldn't be more clumsily done. It has the perception of being political, and that's unfortunate.

The decision that I think—however, the public policy decision to which I made reference, when I was putting the questions to the prior witness about making the decision that we aren't going to build on experience and expertise, instead we're going to a new green field site. And, indeed, all of the other sites were green fields.

Again, I emphasize that from a careful scientific review, which is where we all want to put our emphasis, even above cost, that may be the correct decision.

It is, though, again a political viewpoint, even though one will say, well, yes, we did consider these things, but never mentioned that very vital decision in the final report, which is read by thousands of people, not mentioning that, look, we tussled with this

question and we came to the conclusion that, all things considered and not referring to cost, but referring to the human factor and the human resources, that building the world's high-energy physics citadel in Illinois took 20 years and we're at the point where we can really do something now. Now, it blossoms.

The scientific decision is not there, but somewhere else. To my way of thinking, that issue should have—in hindsight, said to the Academy, using the very best scientific expertise we have, you fellows, you know, really review this. Come out with your pros and cons so that we have the benefit of your expertise. And, indeed, the nation does and Congress does.

I think that was a major flaw. It's not over with. But, then it was compounded, I believe, when you look at the regional resources. All the pros and cons in regard to Illinois, Fermi was as though it didn't exist.

I'm well aware that amendments were presented during the whole process which, in effect, said:

We should not even consider the physical attributes of the land where Fermi is. We beat those down.

Now, that I think tends, at least for the people in Illinois, to cause some to conclude that there may have been some politics involved. To my way of thinking, on all of their major projects that we are talking about, we rightly peer-review it to death.

And I know, as the Chairman has aptly pointed out, that there are issues here which are not scientific in nature. The Academies can't help there. But there's a lot of technical criteria which is 1,000 percent science, and we can get 10 more opinions before it finally comes to the people who have to make, albeit a political decision, if it's out there in front and put it down in black and white so that people can be assured that that question was wrestled with.

For instance, Mr. Hess, why did no one go to CERN and to DESY and sit down and go over all the pros and cons that they had wrestled with building in an urban area and extending those accelerators? No one from the site task force in the two-year period, as I understood it, ever bothered to go over there and sit down with them and take indepth evidence as to why they made the decision they made to build on their accumulated experience and expertise?

Dr. HESS. I have had conversations with both the Director General of CERN and the Director General of DESY on that subject during the last two years. When the planning stage of the LEP accelerator [26] was underway, it was not automatically to be placed at CERN.

They carried out a competition looking at several other sites in Europe. The only reason they ended up at CERN was because they did not get their member States to agree to any of the other sites.

There were, in fact, sites that the scientists preferred rather than the CERN site. So you ended up with a political situation there that over-passed the scientific involvement.

We have a fair amount of experience in this and I would point out to you, sir, that when we went into the Fermilab decision some 20 years ago, we had a similar situation. And we went into a new

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[26] CERN's Large Electron-Positron Collider, an electron accelerator.

area, into a green field, and put the machine in that green field rather than going to Brookhaven, which was one of the proposed sites at that point.

There are merits on both sides of the argument. You should go to a new site or you should go to an existing site?

Mr. FAWELL. Absolutely. I'm not here to say that you made the wrong decision. I'm here to say, though, that the political and the generic sense, in the good sense of the word, that in something so vital, costing so much money, that everything possible could be done to have those issues to which you just referred actually addressed and put down in a good academic forum and point out here are the pros and cons.

This country has always gone the way of the green field site. And why we think it's good here, and so forth, and why when Europe wrestled with that question and went the other way, it would have been from a political viewpoint, I think, in hindsight, so much for the better.

I do agree with what I more than intimated, with what others have expressed, I don't think we took full advantage of the peer review process. Nowhere near what customarily and the credit of DOE has taken advantage of in the determinations of other major projects.

The when and the where. We do get opinions from them. It doesn't mean that Congress has to follow that. And, certainly, we know that Congress doesn't always follow that. So I simply express my lamentations here that I think it was—at least from the viewpoint of Illinois—they didn't take advantage of what scientifically was available.

Chairman ROE. I appreciate the gentleman's concern. Let me ask a question before I call on Mr. Wolpe.

If DOE knew then what it knows now, is there any overriding reason that you're aware of that Congress should switch its intention, for the reasons mentioned in the scientific aspect, from Texas back to Illinois?

Dr. HUNTER. No, sir, not on my part.

Chairman ROE. Would the program have benefitted, from your knowledge? Would the program have benefitted if we had selected Illinois because there was a seat of expertise there over what the new site and the new approach would be in Texas?

Dr. HUNTER. In my judgment, you're asking if we had selected Illinois would that have appreciably offset the presence of scientific resources there, would that have appreciably offset these other factors? No, sir.

Chairman ROE. Do you think that the determination made by DOE in any way skewed that observation? In other words, came to the point that they did not select it at all because it was there?

Dr. HUNTER. No, sir. Under the ground rules laid out, including the Domenici rule, which was imposed directly on us, you know, by the Congress, this was carried out over a period of roughly two years. It was on schedule. It was a well-executed exercise and very complicated, with a very large number of people looking at a lot of detailed, technical factors.

And I would, frankly, to substitute my judgment on that particular matter, which I don't view as being an overwhelming one for that collective judgment.

Chairman ROE. It's an important point. If the Committee will indulge me a little bit.

You know, I've listened to this peer review. I've been here 21 years, so I have listened to this peer review bit for quite some time. And I have never sat in a meeting at any occasion where there were two scientists involved or two members of Congress who agreed on anything.

So the assumption that there is some greater expertise out there, some oracle of wisdom as the rays from above, who determines that that's where we've got to locate it because of some reason. It would seem to me initially, if we were to locate it at Fermilab and these were green fields, we started from some place new.

I'm not coming down either one way or another. Being from New Jersey, I can afford to be neutral here. But, be that as it may, I don't think that we should say that every time we're going to do something that's in the high-energy technological field, that because somebody has built somebody here, that's where it should go.

We never would have developed the West on that basis. We never would have developed the country on that basis, is what it amounts to.

What is significant to the Chairman, however, me, the chairman, is whether or not there was some kind of chicanery, somebody's hidden agenda, or something of that nature, that was involved in this decision-making process.

And I can frankly tell you as of now I don't see that, according to what was just reported this morning. That's the point that I think is important.

I don't want to leave these hearings with that feeling at all. If there was an error that DOE made, if DOE did not consider a particular set of circumstances, if DOE did not consider an environmental point, then DOE is wrong on that issue.

But, if the issue is that there is some oracle of wisdom, some great seat of knowledge that would have decided against a particular site, then they should have made that determination.

Dr. HUNTER. Let me make a brief comment, sir.

I was inserted in the middle of this process; again, at the beginning of August. One of the things we did to ensure that politics stayed out of this was to consciously seek or engage with the site task force in discussions of their detailed deliberations.

We, in fact, did not see the ratings until November 8th, when they appeared in their published form before us.

I was extremely impressed by the competence, the dedication and the degree to which these people worked to try to get you a good answer.

I can assure you that there was no political influence that came, to my knowledge, through the Administration on any of these factors at all.

Again, let me just tell you that I'm comfortable with the collective judgment made here. Part of it has to do with my feeling, and that these people did an extraordinarily good job. It was highly professional. They were faced with an extremely difficult task, com-

pounded by the fact that the people who know the value of this and have become convinced of it; then you have to make a decision among a number of people, parties who have done excellent work, on just something that they know and believe is for the good of their own area and the country.

And in that situation, I think they did an extremely good job. They held to schedule and we met the deadlines. We hit everything off, and we separately conducted properly two exercises.

Now I may have made a misjudgment in the mailing of the EIS, for example, but we have not received any real substantive comments that we made mistakes on the environmental process as it evolved. And we do go through these cycles where you pick up your mistakes and you incorporate them to make sure it's all appropriate.

But, in going through all of that, I have not seen any evidence that they made mistakes, significant mistakes. So I just wanted to state that for the record, sir.

Mr. FAWELL. Mr. Chairman, I was wondering, there was one question that I didn't ask.

Chairman ROE. The Chair will defer to the gentleman from Illinois.

Mr. FAWELL. It would be helpful here, and I apologize to the gentleman from Michigan, as I understood it, as far as the site's task force was concerned, they, too, were composed of considerably talented people, of course. They made no recommendation, no determination as to the best site.

That was turned over and the Secretary assumed the responsibility for making that decision.

Dr. HUNTER. Yes, sir, the Secretary made the decision, but they were the group that made up the recommendation to send in the so-called green book.[27]

In the course of the decision, you know, he announced—I don't recall the exact words—that his decision was, you know, in accordance with those ratings.

So they were there providing a major element of the assimilation of these complicated issues. In addition, he had in front of him the briefings from the States, some review documents having to do with the comments we received on the EIS and things of that nature. But they certainly conducted the great bulk of the Department's activities in both the site selection and the EIS activities.

Mr. FAWELL. My only point is, there, again, we did not have the people with the expertise who had assembled all of this information to come out with a recommendation that would be given to the Secretary but, rather, the Secretary, in a matter of 24 hours, was expected to assimilate, review and then, on the 10th, early in the morning, would bring the materials all set and ready to go and make the announcement.

I don't know how one could assimilate all that information during that period of time.

Dr. HUNTER. I would just comment that the Secretary had involvement in this project, as you know, for quite some period of

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[27] "SSC Site Evaluations: A Report by the SSC Site Task Force," Office of Energy Research, U.S. Department of Energy (DOE/ER-0392), November 1988.

time and was in many activities, including, for example, the briefing by the States to him.

In any case, you know, the decision was made. He was the finalist, was selected as the official who was the head of the Department.

Chairman ROE. The Chair recognizes the distinguished gentleman from Michigan, Mr. Wolpe.

Mr. HALL. Mr. Chairman, before he starts his five minutes, could I ask you to yield and extract an answer from Mr. Hess that you asked?

Mr. WOLPE. I'd be pleased to yield.

Chairman ROE. The gentleman from Texas is recognized.

Mr. HALL. I think the Chairman asked a salient question that's been asked all day. That is, whether or not you if gentlemen had had the information at the time the decision was made that you had today, that you would have made a different decision.

Mr. Hunter indicated that he would have made the same decision.

Mr. Hess was given a chance to answer. He simply nodded. I'd like the record to reflect that Mr. Hess would agree with Mr. Hunter on his answer.

Dr. HESS. I agree. I would have made the same decision, too.

Mr. HALL. Thank you, Mr. Chairman.

Chairman ROE. The gentleman from Michigan is recognized.

Mr. WOLPE. Thank you very much, Mr. Chairman.

Mr. Hunter, I'd like to ask two kinds of questions, one that relates to the process generally, and one that relates specifically to the Michigan experience.

I want to go back to what was raised earlier, namely, your definition of the mandate that was assigned to the National Academy of Sciences, and your function here.

Why was it that there was an explicit prohibition on rank—ordering the sites that would be identified as adequate? At least for the purposes, or at least with respect to the scientific and technical issues that were at stake?

Dr. HUNTER. I was not in office at the time that determination was made. Let me just say that, in looking at the materials and what I've seen, I don't know of any prohibition against the Academy for doing a rank—ordering.

I have not seen any prohibition anywhere for that. What I gather happened is that there was a procedure arrived at that was thought to best serve the purposes of that particular phase of the selection.

Dr. Hess may have some additional information, but I think that was the basis on which the ground rules were arrived at for what the National Academy did.

Dr. HESS. We did ask them not to rank—order their sites at the beginning. And I think Dr. Kasper made the correct answer to an earlier question on the subject when he said that if there had been rank—order in the output of that process from the Academy, in some sense, that makes a recommendation: This is the site you should select.

And we thought that was an improper thing to happen. And we wanted to avoid that. Therefore, we asked that they not report it.

Mr. WOLPE. With respect to the nonscientific, nontechnical factors that entered into the decision, I would concur. My question is different. My question is:

At least with respect to the scientific and technical dimensions along which all of the sites were being measured, why was there not a request for rank—ordering? At least with respect to that part of it.

Dr. HESS. With the technical and scientific criteria, the technical evaluation criteria, or essentially the whole process that is used in the evaluation, you can't really separate an attempt to make the scientific position there and the nonscientific position.

Mr. WOLPE. Surely, you can. You have in your own report here different evaluations along each of the criteria. Some of those criteria relate to what would be described as nonscientific factors. Regional resources, for example.

Other criteria, such as geological suitability of this site, I would argue would be clearly much more narrowly defined as scientific or technical.

Is that not correct?

Dr. HUNTER. Excuse me, sir. You're asking why originally, with the National Academy, there was a division among the criteria and the assumption had been rank-ordered and others not?

Mr. WOLPE. I would have thought that if the effort here was to assure to the extent possible the funding decision would be based upon scientific and technical criteria, that the Department of Energy would have liked to have a scientific evaluation as to the best of the sites, the rank—order of the sites, at least with respect to the scientific and technical dimensions.

Dr. HUNTER. So your question really had to do with the output that was asked of the National Academy in addition to the best-qualified list in their opinion, you wanted additional information.

Mr. WOLPE. I would like to have known what the scientists think what site was geologically most suitable in the view of the scientists.

Dr. HUNTER. Again, one factor, I think, in having seen the process is that there is a complicated assessment that you go through. There was an issue of the time and energy available.

You're basically working your way back to the question of:

Why not have the National Academy—you know, do the whole decision, or a large fraction of it?

Mr. WOLPE. No, I am not. I'm simply trying to understand why the Department of Energy would not like to have the best scientific input possible as to the relative scientific merits, technical merits of different sites.

Dr. HUNTER. There's no doubt that the Department of Energy strongly desired the best scientific and technical input to this process. It was simply that in the course of the selection process they asked first for a set of unranked, best qualified States.

You are just saying: Well, why didn't you do it differently? We'll be happy to try to respond for the record.

[The information follows:]

The DOE did try to get the best scientific and technical information on the Best Qualified List of Sites (BQL) provided to the DOE by the National Academies of Science and Engineering. However, DOE did not want the NAS/NAE to select the final

site, because site selection was to remain the responsibility of the Secretary of DOE. Therefore, the NAS/NAE was asked to provide a unranked list of sites to DOE to avoid any semblance of selection by the Academies. After receiving the BQL list from the Academies, DOE collected as much information as possible about each site. Each BQL site was visited for approximately 4 days by the DOE SSC Site Task Force. Detailed discussions were held with State representatives on each technical evaluation criteria. Lists of questions were left for the States to answer. Several scientific consultants were used by DOE to help collect and evaluate this data. A very large amount of data was collected in connection with the EIS. These data also were used in the site selection process. At the end of this process, DOE had very detailed technical data about all BQL sites and the DOE Site Task Force was able to write their report to the Secretary with a very high degree of certainty. The high energy physics community essentially developed the SSC Site Parameters Document, which was used by the DOE in the establishment of the technical evaluation criteria. Additionally, the governors of all states were given the opportunity to comment on the Site Parameters Document; none did. Thus, the Department made a number of extensive efforts to get the best scientific and technical information and advice on which to select the final site for the SSC.

Mr. WOLPE. I'm not asking differently. I am asking why didn't you want more precision?

Dr. HUNTER. You're saying why don't you want some differentiation among the best-qualified?

Mr. WOLPE. Of course.

Dr. HUNTER. I understand. We'll be happy to respond for the record. I don't know the details. That was the method chosen.

Mr. WOLPE. The next level of concern relates to the actual substantive process, the one which the Department of Energy itself was involved in.

I am told that the State of Illinois, evaluating the process that was used here, determined that a review of the officials involved in the ratings for determining the most important technical criteria revealed that there were no geologists among the site task force members and only one civil engineer.

Further, that only one geologist was included on the SSC task force, or adviser's list.

Is that evaluation by the State of Illinois accurate?

Dr. HUNTER. Yes, that's correct.

Mr. WOLPE. That, to me, at least, reinforces the concern I've just raised initially where you have the NAS with the scientists and technical people there and you didn't utilize them in any significant fashion when you made your own determination for the rank—ordering.

Why didn't you at least use NAS with respect to rank—ordering among the scientific and technical dimensions?

Dr. HUNTER. I'm sorry. I'm going to have to ask you again what the question is. I'm sorry that I've not been clear enough. I apologize. I'm trying to understand.

Mr. WOLPE. Let me be very blunt. My sense of it is that the Department of Energy directed the NAS not to rank—order, not only sites, not even to rank—order of the sites or the merits of the sites in order to maintain greater flexibility for the Department of Energy in making its final recommendation.

That greater flexibility obviously would permit much greater political flexibility and at least compromise the scientific and technical judgments that I think would have been useful to have.

I'm particularly concerned when I then look at the method by which the Department of Energy rank-ordered these sites on the

basis of the geology and tunneling criteria, discovering that there was no geologist involved among the site task force members, there was no engineer and only one geologist was included on the task force's technical support advisory list.

At that point, the question is:

How serious were you in trying to get the most scientifically credible kind of evaluation?

Dr. HUNTER. Let me comment on my particular experience again. You're imputing to the Department that it set this up so that, potentially, it would have more leeway to exercise various political desires.

I can simply assure you that I know of no mechanism for them to exercise that that was in effect.

Secondly, without regard to the detailed qualifications, we have not seen any condensing, at least in my mind, attacks on the evaluations themselves. That, in fact, is part of the debriefing process.

What we chose to do is throw everything open. We have responded to concerns expressed to us. We will release all the documents we have. And if people form the opinion that we in some fashion have done an incompetent job, clearly, that's the check on it.

All I'm trying to indicate to you, if our intent was political, what we would have done is we would not have released the evaluations immediately upon announcing the preferred alternative.

Mr. WOLPE. Yes, you would have.

Dr. HUNTER. Let me just finish here. We've had a policy on this to be extremely open and we have with us today the documents, the bulk of the documents that the Site Task Force went through.

We're willing to release those, have anybody look at them. We'll release them to the parties involved.

And I'm here to represent to you, at least as far as I'm concerned—and you can speak to the Site Task Force separately, and I'm sure that GAO will be interested—that there were no political influences or guidances given to members of the Site Task Force in the course of their evaluation. And not even a mechanism for it.

Mr. WOLPE. Let me ask one additional specific question at this point, if I may, Mr. Chairman. I heard the bell go off.

Mr. VOLKMER [presiding]. You're going to get plenty of leeway.

Mr. WOLPE. At the request of the Department of Energy and its consultant, RTT Associations of Michigan, Michigan performed new rock borings in 1988.

As a result, the draft Environmental Impact Statement released in August subsequently upgraded Michigan site geology. It appears, however, that this information was omitted from DOE's final November '88 report on the list of site evaluations. I refer to page 71 of that report where there is this statement, which I understand was acknowledged by DOE now to have been incorrect.

The statement is that:

> The requirement for continuous impermeable tunnel liners and structural support and water control, the Saginaw formation through which 75 percent of the tunnel passes has very low amounts of water.

And there's some technical discussion on both primary and secondary porosity.

Is it true that that reflected an absence of the total data that DOE asked the State of Michigan to supply?

Dr. HUNTER. Let me comment on another part of this, and Dr. Hess can comment specifically about that particular piece of information. And we will be happy to supply an answer for the record as well, because I don't know the details of that piece of data.

First, once the preferred site was designated, there was a period of time before the final decision was reached in which data relating to the EIS, for example, and what not, you know, could have been brought to our attention.

So, the November '88 document designated Preferred Alternative was not the final decision document, if you will, for this. And there were intervening examinations between that time and the final decision as to any data that was brought to our attention, and in particular with the FEIS [28] process. So that it was not necessarily the last word on that type of thing.

All changes were considered explicitly by the site task force prior to the final record decision.

Having said that, let me ask Dr. Hess to comment on whatever details he has here and we will give you a response for the record also.

[The information follows:]

All geological information provided by the State of Michigan was reviewed by the DOE prior to making the site evaluation. The Site Evaluation Report, on page 72, notes that the database for the Michigan site contains information from 28 coreholes. These holes include all the supplemental borings mentioned by the State in its testimony. The date provided by the State indicated a high degree of variability, both laterally and vertically in the properties of the rock units through which the SSC tunnel would pass. This included a wide range of potential water inflows into the tunnel. There was not enough information to allow the DOE to determine specific lining requirements for specific tunnel segments. Thus, a conservative approach was adopted which assumed that a continuous impermeable liner would be required.

Dr. HESS. Let me comment with respect to the statement on page 71 that you referred to in the green book.

It is our understanding, still, that there will be requirements for continuous impermeable tunnel liner for both structural support and water control. The Saginaw formation through which 75 percent of the tunnel passes yields variable amounts of water with permeability from 10 to the minus 2 to 10 to the minus 6.

But, when we made our site visit out there, we asked questions about the permeability to find out if we had proper information or not. We found out that there was information available at that time that had not been passed to DOE, saying that they had measurements of permeability of 10 to the minus 3.

We inspected some of the core samples and found pieces of the quarry which you could blow through. You take a piece of core and go like that [Dr. Hess demonstrated] and a gush of air comes out the back end.

The people at that time—this involves both Michigan and DOE geologists—were of the opinion that the permeability of that sample was probably 10 to the minus 1.

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[28] Final Environmental Impact Statement.

That's an aquifer. That's material that water flows through easily. We would stand on our statement that says that this material is very permeable and will require a liner.

Mr. WOLPE. Let me ask the question that you responded to, the other part of the generic question, as to whether or not information that had been required from the new rock borings was incorporated into DOE's final report, the November report.

Dr. HESS. Yes, it was. And those additional rock borings helped considerably. They, in fact, made an overall profile of the tunnel look rather better than had been thought to be the case earlier. But that doesn't change the validity of the statement.

Mr. WOLPE. The other question that I raised relates to the Environmental Assessment contained on page 74 of the report. My understanding is there was a misunderstanding of the acreage involved as it related to wetland and the consequent assessment of that section.

I don't have the detail on that.

Dr. HESS. What is your question, sir?

Mr. WOLPE. Whether or not the DOE stands precisely by its judgment on page 74 with respect to environmental impact.

Dr. HUNTER. While we're going through that, and we'll give you a reply for the record.

[The information follows:]

The acreage of impacted wetlands as stated in the draft EIS was found to be incorrect and inconsistent with the wetland calculations done for the other States (and the Site Task Force immediately recognized this).

For the final EIS the wetlands impacts were reevaluated for all the sites. Wetland locations and type were determined from the U.S. Fish and Wildlife Service National Wetlands Inventory maps. The wetland impacts were based on estimates of the acreage of habitat that would be disturbed by construction of surface facilities. The acreage of affected wetland habitat was determined from the amount of wetland associated with each facility, up to the maximum amount of surface disturbance expected.

There would be approximately 567 acres of wetlands in fee simple areas at the Michigan location. The initial development of the Michigan site would impact approximately 190 acres of wetlands. An additional 319 acres of wetlands could be affected by development of future expansion acreas.

Wetlands still would be considered relatively abundant and more importantly, of relatively high quality and value. DOE stands by its evaluation that these wetlands are one of the several environmental weaknesses of the Michigan site.

Dr. HUNTER. Let me just say that it became apparent very early that there were discrepancies within the DEIS,[29] in particular on the amount of wetlands involved for Michigan. Mr. Moore of Michigan,[30] particularly in the presentation to the Secretary, made two strong points. One was that Michigan had a particular legislative apparatus to deal with wetlands as a result of its excellent policies; and, second, that we had mistakenly put a larger amount of wetlands in the report than, in fact, was the case.

I believe that was corrected in the FEIS. But, as early as that briefing and, in fact, before it, I was involved in discussions where it was made aware to me by the Environmental Health people that we had, in fact, over-estimated the amount of wetlands affecting Michigan. We knew that early and it was incorporated early.

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[29] Draft Environmental Impact Statement.

[30] Mr. Michael Moore, Michigan Department of Natural Resources.

And it later showed up, I believe, in the FEIS.

Mr. WOLPE. Thank you, Mr. Chairman.

Mr. VOLKMER. The Chair now recognizes the gentleman from Texas.

Mr. HALL. Thank you, Mr. Chairman. I think this hearing is certainly allaying any fears of a political decision. Frankly, a lot of us were fearful of a political decision initially. I'm sure that was expressed to you from different States.

You know, when we see a guy like Robert Hunter, Jr., with a B.S. degree in Physics from Stanford and his Ph.D. from California, appointed by a President from California, we could just see the Ronald Reagan Institute of Technology out there and the super collider going to California. That's one reason we kept saying, "Earthquake! Earthquake!" [Laughter.]

But, I think your answers and the answers of the gentleman who preceded you pretty well answered the questions that have been legitimately propounded to you.

Chairman Roe, I think, answered Mr. Walker's suggestion that not enough time and not enough scientific input was put in by the Academy.

Isn't it a fact that sometimes you have to get practical and you have to get right down to making the decision? And I don't suppose that decision was totally a scientific decision, but it had to be a decision based on the ingredients that you cranked into the computer.

And did you not crank six ingredients in, basically, that you had to rate each of the States on? Isn't that the way you took care of the final eight?

Dr. HUNTER. Yes, sir, there were six major ratings and then there was a seventh, which was the life cycle costs, which were summarized as well.

Mr. HALL. On the geology and tunneling, the terrain would have something to do with that. And, of course, the fire ant—we call them "far ants" in Texas, but fire ants. It's an important thing. You put it in the computer and you considered it, didn't you? And then regional resources, that's kind of dollars and cents you're talking about there, isn't it? Regional resources?

Dr. HUNTER. I think the regional resources that I referred to, a variety of aspects.

Mr. HALL. Highways.

Dr. HUNTER. Yes. What's available in terms of facilities, schools, things of that sort.

Mr. HALL. Then you go on to the environment—that's only one of six. You're setting your regional conditions, your utilities. You take all of those and crank them in and consider all of them. And that's one way that you all arrived at your life cycle costs, was it not?

You had to consider all of those?

Dr. HUNTER. Yes, sir. The life cycle costs, I believe, were evaluated separately from the other six criteria. They simply represented the costs based on the local aspects, if you will, plus the overall construction project as to what it would cost to build at a certain site.

I believe they were evaluated separately from the other criteria.

Mr. HALL. But, when you determined life cycle costs, as I understood it, that was the estimate for construction, plus a 25-year operating period that you cranked into the life cycle cost.

Is that right, Mr. Hess?

Dr. HESS. Yes, sir.

Mr. HALL. So you would take into consideration the condition of the utilities, the terrain, the regional resources, what it cost for the tunneling and how straight they could be.

All those things that you're now considering, you considered then? And it went into the final decision that you made in selecting Texas?

Dr. HUNTER. Yes, sir.

Mr. HALL. If you had known then what you know now and you could take into consideration then what you can take into consideration now, you'd really be, on those regional resources, you'd be a billion dollars better off in making that determination, because you were precluded from that determination by the DeConcini Amendment? [31]

Dr. HUNTER. Sir, I would comment that we returned the envelopes of the other parties unopened. So we may be better off in terms of total program costs, but since we don't know what the other parties offered, we cannot say for certain as to what the comparative numbers would have been if we had included those numbers.

Mr. HALL. But that offer was on the table from the word go from Texas, was it not? And the people voted a billion dollars—around $700 million—directly to reduce construction costs?

Dr. HUNTER. Sir, that was not included as a criterion in this evaluation.

Mr. HALL. I understand that, but you know it's there now. And had you known that then, instead of a 10.8 total life cycle cost for the State of Texas, it would have been 9.8?

Dr. HUNTER. No, sir, even if we knew it then, we were precluded from using it. And since we then and now still do not know the details of the other parties' offers, we can't say what those numbers would have been.

Mr. HALL. Well, you took into consideration the Fermi facility. Surely you did, a great facility like that.

Dr. HUNTER. Yes, sir, but we did not know what Illinois actually offered us. It was in an envelope, literally. We took one of them, we opened it; the other ones, we sent back. I can't tell you what their offers really were or what they would have meant for the project.

Mr. HALL. I think you answered the Chairman's question to my satisfaction. And I want to certainly thank you for your time. I think that this hearing highlights the fact that there was no chicanery. It highlights the fact that there was no politics played, because it would have been very easy for you to have included the President of the United States' home state, at least in the final eight.

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[31] Mr. Hall intended to refer to Senator Domenici's amendment here.

I certainly appreciate the time the Chairman has given me. And I'll tell you something else I appreciate. I think we might as well just lay it out on the table here

I appreciate these people from Illinois who feel like that they maybe were the first runner up. They may feel a little like Seton Hall feels today,[32] and I think they should because we really have two national champions, as close as that game was. And these men and these members of Congress, as parochial as they are and as they should be, are still in here supporting this program.

And I think that should mean something to the people that they represent, and it certainly should mean something to the rest of us.

And I appreciate it. I yield back my time.

Mr. VOLKMER. Mr. Hunter, I have a few questions.

How far is Waxahachie from Dallas/Fort Worth?

Dr. HUNTER. I don't know precisely, sir. I believe it's about 30–40 miles. We could get a better number here in a minute.

Mr. HALL. It's 30 minutes from there.

Mr. VOLKMER. It keeps getting shorter. Anywhere from 30 minutes to 60 minutes to an hour and a half. I guess it depends on what side of Dallas or Dallas/Fort Worth you live. If you live on the east side, I guess it's going to take a lot longer to get there than if you live on the west side.

Dr. HUNTER. We'll provide you with an exact answer for the record, sir.

[The information follows:]

As pointed out on page 11 of the Site Task Force Report, the Texas site is located approximately 25 miles south of Dallas and 35 miles southeast of Fort Worth.

Mr. VOLKMER. The reason I say that, you know, I'm one who lives in a rural area when I'm back in my District. Always have lived in basically a rural area. I've never lived in a metropolitan area. When I came up here, I had to basically relocate my family. And I made a decision.

I'm just curious what kind of decision either you or Mr. Hess would make, I don't know.

Mr. Hunter, are you married?

Dr. HUNTER. Yes, sir, I am.

Mr. VOLKMER. Do you have children?

Dr. HUNTER. Yes, sir.

Mr. VOLKMER. Yes? Let me ask you this question. If you had a choice and you got the same amount of pay, if you had a choice to go to an area where the housing is inexpensive but the educational programs are average for your children and you can get a nice, big house for a lot less money—50 percent less money—or you can go to an area that has high-priced housing, but excellent educational opportunities for your children, and you may have to buy a smaller house, what would you choose?

Dr. HUNTER. Sir, you picked the wrong fellow to ask. My family is still in California. My wife won't leave the house. [Laughter.]

And I'm making appreciably less than I was previously. And so I'm not sure that I'm the right person to ask. I think that would

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[32] The University of Michigan Wolverines defeated the Seton Hall Pirates, 80–79, to win the 1988 NCAA basketball championship on April 3, 1989.

basically depend on the details and what it means to the people involved.

The high-energy physicists in general, because they've evolved the habit of working at facilities that are remote from where they live; that is, Fermilab you've heard about today, for example, hosts people from at least 100 universities in this country.

And they will undergo the sacrifice and separation from their home base even for very extended periods of time to run their experiments.

So I think, if you're putting the question in that context, you're asking it of a very highly-motivated people who do not hesitate to travel extreme distances and spend a long time away from home.

So they would make that calculation. I would not make the same calculation.

Mr. VOLKMER. It's a general calculation, this question of relocating your family. It really doesn't sometimes enter into it, in other words.

Dr. HUNTER. Yes, sir, that's what I'm trying to say. That's why I feel uncomfortable without knowing the specifics of the people involved.

Mr. VOLKMER. The reason is because that's the two that I see. In other words, Fermi is the one and the other, Texas site is the other.

To me, you know, I know where my choice would have been if I had that same choice. But you're saying that isn't so, so let's drop the whole thing.

Dr. HUNTER. Let me just comment. Governor Thompson gave a particularly eloquent argument, which is: If he was in a place that had people around it that had excellent resources and what not and said I'd much rather be there than in a place that was just in a rural area or whatever. I think there are arguments on all sides, but the physicists, in particular, are willing to go very long distances and undergo a great deal of separation to have access to the machines.

Mr. VOLKMER. The other thing that I noticed—perhaps you can correct me in my interpretation of it—first is that when the National Academies of Science made their recommendations on the setting, all of them—we don't know which one was which, but all of them either had a good or satisfactory rating—but when the Department of Energy made a finding on the setting, we find that some were outstanding, some were satisfactory, some were good and one was poor.

Dr. HUNTER. So you see a difference in the ratings?

Mr. VOLKMER. Yes, I do. There had to be something somebody used, subjectively looking at the same material, leading to different conclusions; or somebody added something to the material to come up with the differences.

Dr. HUNTER. We'll submit you an answer for the record but let me just say that, in general, several things happened. There was additional information that was sought by the Department and added to.

Secondly, there were site visits conducted to the groups in the National Academy, as you heard earlier, who did not conduct site

visits. We did conduct extensive site visits and had, you know, the advantage of that additional information that was gathered.

Thirdly, I also recall the exact evaluation criteria and the numbers of categories were slightly different between the National Academy and the DOE evaluation.

But we would provide an answer for the record to you.

[The information follows:]

The Academies' committee was using the same criteria as the site task force in evaluating setting. We think the apparent discrepancies between their findings and our findings in setting are explainable however, for the following reasons:

DOE was able to obtain additional information from the site visits which affected judgments in the setting area and which could be understood only by the onsite visit.

The meetings with the proposers provided a great deal of insight into the organizational structure available to manage the acquisition of the site; this information had a significant bearing on the task force's evaluations; this information was not available to the Academies.

Additional information was obtained in the form of written questions and answers which assisted DOE in its evaluations. This information was obtained only from the best qualified list of sites, and was not available for the Academies to consider.

If the Academies' committee had access to this additional information, we believe that they likely would have come to conclusions similar to ours, though we recognize that different groups of reviewers are likely to have legitimate differences of opinion.

Mr. VOLKMER. I'd like to have an answer to that. I'm just curious as to how it came about.

The other observation, and this is an observation, not necessarily a question. If you want to comment on it, you may.

As was alluded to before here, talking about the Fermilab siding and the campus area and other rail sidings, what are we worrying about a rail siding for if Texas isn't going to have one?

Dr. HUNTER. I couldn't hear you, sir, the bell was ringing.

Mr. VOLKMER. I was saying that the regional resources mentioned in here about the Fermilab in Illinois, in addition to the existing Fermilab rail siding and campus area, the State has offered to construct another rail siding south of the far cluster area.

What's the need for a rail siding? Texas isn't going to have one.

Dr. HUNTER. Let me ask Mr.[33] Hess to comment on that.

In general, while there are some very large pieces of equipment here, single pieces of equipment that are built to be in the range of thousands of tons, for example, in Texas, they are brought in by pieces and transportation is an issue in that sense, the large, load-carrying transportation units.

So the construction of this, this is a very large construction project and I think that the transportation accessibility is an issue.

Dr. HESS. I agree with that. It's a matter of bringing in big pieces of equipment; that's the key. It might be that we would ask to have a rail siding built into the areas where we would want to transport at the Texas site.

Mr. VOLKMER. Right now, that's not proposed as I read this. Let me find it here.

Dr. HESS. I think you're correct, but we could still go ahead and do it if we, in the design of the project, wind up feeling that it's necessary.

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[33] Dr. Hunter indicates that this should be Dr. Hess.

Mr. VOLKMER. All right. The last thing is, the other observation is, it appears to me in looking at it, and I'm trying to look at it objectively, that the Fermilab siding actually serves to the detriment of the Illinois proposal, not to enhance it.

The only other mention that I find other than the railroad siding is in the second provision where it got a poor recommendation. It says:

> Illinois utilized existing accelerator facilities at Fermilab to serve as a proposed injector for the SSC. In doing so, the designers were willing to make minor shifts of the collider ring during the final design. And, in addition, the large amount of development in the immediate area of the proposed . . . reduced the flexibility in a number of similar areas.

Now, I don't find anything in there that says great things are going to happen because of the Fermilab, but I find that.

Dr. HUNTER. Sir, let me just say that there was credit given for the presence of the use of Fermilab as an injector, in this accelerator, in the life cycle cost area. When Fermilab was initially sited, there was not the consideration, the extensive tunneling at the deep depths that arose in the proposal that they submitted.

And also the complexity of the land situation tended to aggravate the issue. Could you move it around a little bit to accommodate some change in the design? To maintain flexibility as you want into the project?

So there are some pluses for Fermilab, certainly, and they were explicitly recognized and evaluated in the life cycle cost in the financial sense.

Second, as I indicated to Mr. Fawell, and I'm sure are reflected in the evaluation of the Site Task Force, you know, we think very highly of the Fermilab area in terms of the people, the resources and Fermilab as an institution. So those understandings are reflected in here, even though they may not be explicitly spelled out by the associated name.

What I said earlier was on regional resources, as I recall, where there was, I think, people who were concerned about the lack of mention of Fermilab. I believe it had an outstanding rating.

So, even though the name wasn't mentioned explicitly, it would not have received an outstanding rating if people were not aware of what was there.

So I think it's implicit in the report even though the language may not have called that out explicitly.

Mr. VOLKMER. I have no further questions.

I recognize the gentleman from California.

Mr. PACKARD. Thank you, Mr. Chairman. Let me welcome Mr. Hunter, who comes from my part of the country and my part of the State of California.

Is there a procedure or has there been a procedure for a State to submit a complaint on the selection process?

Dr. HUNTER. Yes, sir, there are two activities here. One is the site selection process itself; and one is the Environmental Impact Statement process, the NEPA process, if you will.

Within NEPA there are clearly spelled out avenues for receipt of complaints and things of that nature. And there are, in fact, designated waiting periods. This designation in November of the preferred alternative, not lightly said, it's a legal designation. And

until the final record decision which has to follow some period of time later, you know, it's open for people to comment. In fact, both from the draft Environmental Impact Statement period in which we received comments on it and responded to them before the issuance of the final, there are those kinds of periods that are available for pursuing formalized and spelled out complaint procedures under the legislation.

In addition, on the selection process, there are various mechanisms, more than you could conceive of, for being concerned about the site selection process.

There are a variety of mechanisms available.

Mr. PACKARD. Has any State issued any formal complaints on the process?

Dr. HUNTER. No, sir, not to date. We have seen—there was, I believe, a letter written by Illinois. We received feedback on the debriefing process, which we have replied to.

There was a letter, I believe, sent by Illinois to the President expressing their feeling that perhaps we had not made the proper decision. And the grounds for it.

But we have seen none of the formalized types of activity. And, interestingly enough, in terms of comments on the final Environmental Impact Statement, our people, the complexity, the size of it and the significance of the activity, our people feel they have seen the lack of activity for substantive comments on errors made and things of that sort as being, you know, very unusual, given the difficulty of it.

Mr. PACKARD. If, for whatever unforeseen reason, Environmental Impact Statement or whatever, it was determined later on that the Texas site would not be able to be built upon or would not be suitable, would we have to go through another selection process? Or is there a second alternative site in the selection process that has been selected? And a third and a fourth?

Dr. HUNTER. Sir, I hesitate to speculate on all of the possible futures, but as I understand the NEPA process, in coming to the final decision, we now have selected, made the final decision on the site.

There is no ranking, if you will, second, third, fourth and fifth, we have made that decision and have complied with both the NEPA requirements and the site-selection requirements.

Mr. PACKARD. So you'd probably have to go back to another selection site if, for whatever reason, the Texas site was not built?

Dr. HUNTER. I would simply hesitate to speculate on that, sir.

Mr. PACKARD. I'm sure this has been discussed, but just to clarify in my own mind, the financial incentive packages that were sealed and submitted with the applications, the press—and there was some common knowledge as to the contents of some of those packages. It was known, for example, publicly, that in Texas, the package was somewhere around a billion dollars of bonds and other incentives, and about half that amount in the Illinois package.

Did that common knowledge have any influence on the selection process?

Dr. HUNTER. Again, I was not directly involved in the evaluation process. To the best of my knowledge, from what I saw, it did not. One thing, we saw a lot of things in the press. I saw clippings from

people who said, you know, "They have a billion," or one point one, or whatever, but until you see the detail of any of the offerors and had a chance to examine them carefully and see what they actually mean, you know, that's a basis on which I don't think you can concretely form any opinions.

But, to the best of my knowledge, I saw no evidence of that type of publicity having any effect on the selection process.

I guess I would ask Dr. Hess if he cared to comment. He was the head of the Site Task Force.

Dr. HESS. The matter of incentive has played no role whatsoever in the Site Task Force deliberations. We specifically stayed away from that, and it was not considered ever in our deliberations.

Mr. PACKARD. Even though it was generally common knowledge?

Dr. HESS. Whether it was or was not. You've got conflicting stories in the press about some of the situations.

Mr. PACKARD. Maybe a final question, Mr. Chairman.

I'll ask essentially the same question that I did to Dr. Kasper. And that is:

Were there documents, letters, information passed to any of the States, the eight finalists, the seven finalists, ultimately—any of the States—that was not passed to all the States?

Dr. HUNTER. Well, sir, I can only tell you what I have knowledge of. There was an instance in which I think one of the reports did find its way that DOE had done—not a proposal document from the State, but a report that bore on the DOE's examination of an issue where it ended up at another State during the course of this.

There was an instance of that. That was noted.

Mr. PACKARD. Did that influence, in your judgment, the outcome?

Dr. HUNTER. No, sir. I explicitly queried the members of the Site Task Force about that, and the indication was that it had not.

So that's where it stands.

Mr. PACKARD. Has that particular incident that you referred to had any response from other States that were in the competition?

Dr. HUNTER. Well, I believe, I think we exchanged correspondence with the States who felt they were affected; that is, who felt that the document bore on their particular activity. We had exchanged correspondence with them about that.

Then we looked into the matter and explained to them how it happened.

Mr. PACKARD. Mr. Hess, were you and your committee involved in that? Did it have any effect upon the outcome?

Dr. HESS. No, we weren't involved, and it had no effect on the outcome.

Mr. PACKARD. Did that incident take place after the selection was over?

Dr. HESS. No, it was earlier in the process.

I might add one other point to what you said earlier. Were there any differences in the treatment of one State with respect to another State.

We went on site visits to each one of the best qualified list States and at the end of those site visits, we passed a list of questions to that State.

Now, those questions were not identical from one State to another State because during the site visit, we would turn up something we wanted more information on; therefore, they were structured to that particular State.

In that sense, they are not the same.

Mr. PACKARD. Thank you, Mr. Chairman. That's all I have.

Mr. VOLKMER. Thank you. I'll conclude this panel.

Mr. HALL. Mr. Chairman, I'd like to ask unanimous consent inasmuch as some members have inquired about the distance from Dallas to Waxahachie, to leave a place in the record for me to put that distance. And also to leave space in the record for us to give you an update on the availability of railroad sidings and rail traffic in Ellis County and Waxahachie.

[The information supplied by Mr. Hall follows:]

WILLIAM P. CLEMENTS, JR.
GOVERNOR

HENRY M. GANDY
DIRECTOR

THE STATE OF TEXAS
OFFICE OF STATE-FEDERAL RELATIONS

The Official State of Texas Mileage Guide (August 1988 through July 1989), published by the Statistical Research Service, sets the distance between Waxahachie, Texas and Dallas, Texas at 27.1 miles.

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Volume 4
Regional Resources

Texas National Research Laboratory Commission
Superconducting Super Collider
Dallas – Fort Worth

4.2 HIGHWAYS, STREETS, ROADS, AND RAILROADS. The Dallas - Fort Worth region's extensive, modern network of master-planned thoroughfares provides fast and easy access and region-wide mobility. The area is served by 568 miles of freeways varying in width from four to eight lanes. By comparison, the 6-county Chicago metropolitan area has 215 miles of freeways, and the 10-county San Francisco/Oakland area, 627 miles. Dallas - Fort Worth also benefits from more than 5,100 miles of arterials which transect the area. Three Interstate Highways and one U.S. Highway traverse the area on a north/south axis, two Interstate Highways and one U.S. Highway are the major east/west constituents, and Interstate Loop systems encircle both Dallas and Fort Worth. Five railroads serve the region and traverse all four quadrants of the Dallas - Fort Worth SSC location.

4.2.1 Ground Transportation System.

4.2.1.1 Highways, Streets, and Roads. The Dallas - Fort Worth SSC Site benefits from its semi-rural location within a master-planned transportation grid which provides direct, multilane links to the region's resources. Only one of the four arteries serving the site, IH-35E, is carrying as much as 50 percent of its rated traffic capacity during peak periods. In addition to IH-35E, which traverses the site, four-lane, limited access U.S. 287 crosses the site on a generally northwest/southeast axis. IH-45 is adjacent to the site, IH-20/Interstate Loop 635 is 10 minutes north of the campus, and U.S. 77 generally parallels IH-35E. Figure 4.2.1.1-1 shows the major roadway facilities in the area, including number of lanes, peak-hour traffic volumes, and design capacities. IH-35E has a peak-hour volume of 4,280 vehicles, or only 55 percent of its 7,800-vehicle capacity. More importantly, the average traffic volume is 1,630 vehicles per hour, or only 21 percent of capacity. Similarly, U.S. 67 and U.S. 287, which provide access to the site from the nearby Dallas suburbs of Duncanville and Cedar Hill, have peak volume-to-capacity ratios of 31 and 35 percent, and average traffic volumes which are far below their respective peak-traffic levels.

The relatively low present traffic volumes on the major traffic arteries which serve the site, coupled with master-planned expansion of the highway network, assure quick and easy ground transportation access to the Dallas - Fort Worth SSC location now and throughout the life of the project.

In addition to their accommodation of passenger vehicle traffic, IH-35E, U.S. 67, U.S. 287, and U.S. 77 are capable of supporting the local and long distance carrier traffic required during and following SSC construction. All of these roads are rated to carry the maximum gross vehicle weight limit (80,000 pounds) and are ready for immediate use in serving the site.

4.2.1.2 Railroads. Five existing railroad lines carrying 22 trains per day traverse all four quadrants of the Dallas - Fort Worth SSC Site. The area is served by four Class One railroads: Missouri-Kansas-Texas, Burlington Northern, Southern Pacific, and the Santa Fe. The major rail lines are shown

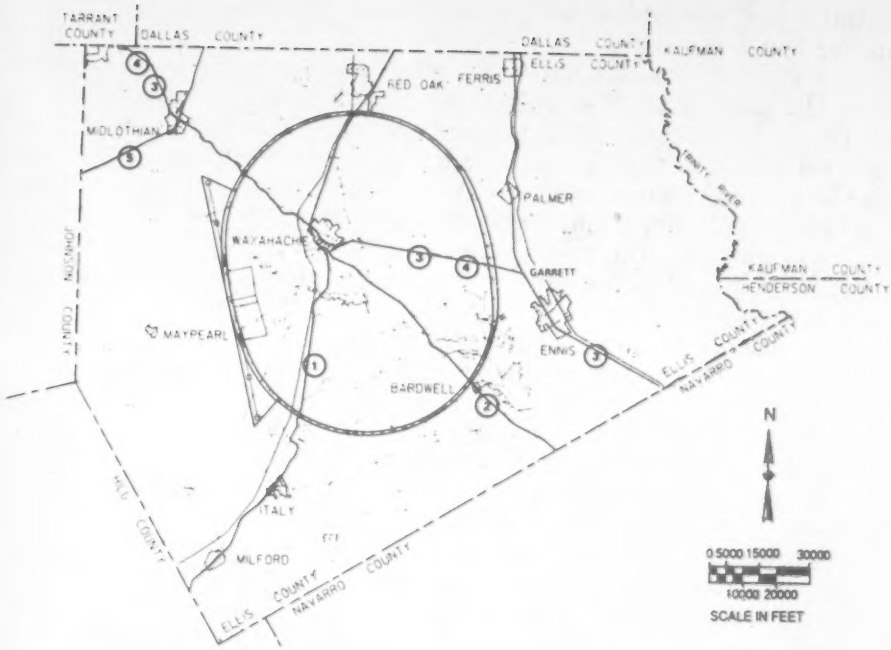
in Figure 4.2.1.2-1. The railroads are capable of handling outsized freight and loads of up to 130 tons per rail car. As is discussed in Volume 7, extensive field monitoring has been conducted to show that the level of service provided by these rail facilities does not cause detrimental vibration at the SSC tunnel location. The nearest depot and off-loading facility is located at Midlothian on Santa Fe's Midlothian House Track (CLIC 8711). This facility is located adjacent to U.S. 87 which provides direct access to the SSC Site. The current capabilities of the Dallas - Fort Worth railroads will fully support SSC needs.

4.2.2 Improvements to Road, Highway, and Rail Networks. For the last three decades, Dallas - Fort Worth has been one of the nation's fastest-growing metropolitan areas. To keep pace with that growth, the area's leaders in the 1960s launched a series of long-range planning programs to provide for population growth into the 21st Century. One recent milestone is Mobility 2000, a master transportation plan developed by the North Central Texas Council of Governments and the Regional Transportation Council. To maintain and enhance the integrity of the existing transportation network, the plan calls for an additional 288 miles of freeways to be built within the next 13 years, an expansion of 50 percent over the present system. An additional 12,000 miles of arterials will be built above and beyond the present 5,100 miles, an increase of 25 percent. As a result, the growing highway infrastructure needs of the area, including the SSC, will be met in the same manner that the Dallas - Fort Worth region has accommodated past growth. A description of the plan and the prescribed routes is provided in Appendix Exhibit 4.2.2.

4.2.2.1 Highway Improvements. Secondary roads in the immediate vicinity of the site, as distinguished from the major arteries which traverse and adjoin it, were designed for low traffic volumes and low vehicle weights; therefore, some improvements will be required. Specifically, 211 miles of existing roads will be upgraded to increase carrying capacity to the maximum load capacity allowed (80,000 pounds), 4.7 miles of two-lane road will be expanded to four lanes and 2.1 miles of new road will be constructed. These relatively minor projects have been approved pending SSC siting and will be accommodated in the Texas Highway Department construction budget, as described in the Minute Orders contained in Appendix Exhibit 4.2.2.1-1.

A map of the planned improvements is shown in Figure 4.2.2.1-1 and details of the operational phase traffic analysis are presented in Appendix Exhibit 4.2.2.1-2.

4.2.2.2 Railroad Improvements. Convenient rail access is provided by the railroad infrastructure of the Dallas - Fort Worth area combined with the existing railroad lines that traverse all four quadrants of the SSC ring. Although ample opportunity is offered to provide direct rail spur access (Missouri-Kansas-Texas line 112), the proximity of off-loading facilities to the site (Midlothian) will eliminate any need for special spur additions.



RAILROAD LINE	CURRENT TRAINS PER DAY	RAILWAY LINE CLEARANCES	MAXIMUM GROSS WEIGHT FOR RAIL CAR
MISSOURI-KANSAS-TEXAS (MKT) LINE 112 DALLAS COUNTY LINE TO HILL COUNTY LINE (1)	1	A. 20'0" HEIGHT B. 6'6" WIDE C. 17'3" HEIGHT D. 12'0" WIDE	263,000 POUNDS
BURLINGTON NORTHERN LINE 314 DALLAS COUNTY LINE TO NAVARRO COUNTY LINE (2)	4	A. 20'0" HEIGHT B. 12"0" WIDE	236,000 POUNDS
SOUTHERN PACIFIC LINE 902 DALLAS COUNTY LINE TO NAVARRO COUNTY LINE (3)	6	A. 20'0" HEIGHT B. 10'10" WIDE C. 19'3" HEIGHT D. 12'0" WIDE	315,000 POUNDS
LINE 924 TARRANT COUNTY LINE TO GARRETT (4)	6	A. 19'9" HEIGHT B. 10'2" WIDE C. 18'9" HEIGHT D. 12'0" WIDE	263,000 POUNDS
SANTA FE LINE 13 DALLAS COUNTY LINE TO JOHNSON COUNTY LINE VIA MIDLOTHIAN (5)	5	A. 21'0" HEIGHT B. 6'4" WIDE C. 18'6" HEIGHT D. 12'0" WIDE	263,000 POUNDS

D4-6205

Figure 4.2.1.2-1. The railroads to the SSC Site provide excellent rail and truck transfer services.

Mr. VOLKMER. My understanding is there are railroads in that area, but I just noticed when I looked there that there was no rail siding for the Texas area.

Then I started wondering, well, why was it made a discussion point in Illinois? That's the only thing that I came up with.

Mr. HALL. I think one of the members made the reference to the siding and all the other great attributes that the Fermilab afforded, the lack of reference to those. And I think these gentlemen preceding this panel very accurately answered that.

Mr. VOLKMER. I'd like to comment, agree with Mr. Hess. I think you can build a railroad siding. You can physically do that. I don't see any problem with that.

I just couldn't see any reason why they would say in Texas that we will be building a railroad siding that * * * but that's my only question.

But that will conclude the panel.

The gentleman from Pennsylvania has a question?

Mr. RITTER. I think the question—I really don't have a major question at this point, but it came out earlier from Mr. Hunter that this project, evolving over the years, had the staunch support of the science community. I guess it was in response to Mr. Walker's question. You know, with all due respect, I've got to point out that, really, outside the high-energy physics community, outside the community of the scientists, technologists and engineers who will benefit by the contract for this, the program is virtually devoid of support from the science and engineering community. There aren't that many people who will go down there and are willing to talk about it.

But I think if you polled condensed matter-physicists—those physicists who are concerned with the physics of the solid state, which is the forefront area in global competitiveness—if you talk to the science and engineering community, the political pressures that have been put on so many, I think you will find that the support for this is very thin.

And the real question is not site selection, but I think these questions will come out—perhaps more in the authorizing hearings and in the budget process and in the appropriations process; the real question is not how for the SSC, but if.

Mr. VOLKMER. I'm going to have to conclude this panel because this room is supposed to be used for another hearing.

I want to thank both Mr. Hunter and Mr. Hess for your testimony. If you can, we'd appreciate having the written responses within 10 days.

Thank you very much.

Mr. VOLKMER. We have a vote on, but before we go, I'd like to proceed with Ms. Flora Milans, Associate Director, Energy Issues, Resources, Community and Economic Development.

Ms. Milans, where art thou? If you can come forward.

Ms. Milans, your full statement will be made a part of the record at this point in the record. You may either review that full statement or summarize it, however you so desire. You have only seven minutes to do it either way you want to do it.

STATEMENT OF FLORA H. MILANS, ASSOCIATE DIRECTOR, RESOURCES, COMMUNITY AND ECONOMIC DEVELOPMENT, GENERAL ACCOUNTING OFFICE, ACCOMPANIED BY RICHARD CHESTON, EVALUATOR

Ms. MILANS. With the Chairman's permission, I think I'll summarize. I have with me Mr. Richard Cheston, who is the Evaluator in charge of both assignments which we are here today to discuss.

We have issued a report on the selection of the seven best-qualified sites in response to a request by Senator Lott and this Committee. We're also completing a review of the selection of the final site in response to a request by Senator DeConcini on behalf of himself and Senators Dixon, Levin, Riegle, Simon and Wirth.[34]

First, I would like to summarize our earlier review. This was on the process for selecting the best qualified site. We found the following:

One, the Academy's 21 Committee members had expertise in many diverse fields related to the site selection criteria, and were geographically representative.

Two, while the committee used DOE site selection criteria in their order of importance, the DOE invitation could have provided better information about the relative importance of the regional resources criteria.

Three, site costs were a minor factor in the committee's identification of the best-qualified sites.

Four, DOE accepted the committee's best-qualified list of sites on the basis of its own site task force review of each proposed site, the committee's report and a briefing by the committee staff.

Our report made one recommendation: DOE should ensure that for any future site selection process, potential proposers be given the maximum information possible about the selection criteria.

Now I'd like to move on to our ongoing work on the final site selection process.

Our preliminary findings are the task force relied on information provided by the States and verified information, primarily through its site visits to the seven best qualified sites and through the Environmental Impact Statement process.

Our limited analysis provided us no reason to question the decision to site the super collider in Texas. In evaluating and rating the sites, the task force used DOE's criteria and provided evidence to support its ratings.

However, the task force did not provide sufficient documentation for us to, one, resolve an apparent inconsistency between its rating of Illinois as outstanding for the geology and tunneling criteria and its estimate that Illinois would have the second highest underground construction costs; and, two, determine the appropriateness of its use of the weakest link theory to evaluate the electrical power subcriterion.

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[34] "Federal Research: Determination of the Best Qualified Sites for DOE's Super Collider," U.S. General Accounting Office (RCED–89–18), January 1989; and "Federal Research: The Final Site Selection Process for DOE's Super Collider," U.S. General Accounting Office (RCED–89–129BR), August 1989. The full reports may be obtained from the General Accounting Office publication service.

Finally, DOE and its contractors analyzed three concerns: fire ants, reliability of Texas' geological hazards to residents from radiation, and geological data and hazards to the residents.[35]

These concerns were identified by Texas residents as part of the site evaluation, an impact statement process.[36]

DOE determined that these concerns were not serious problems. According to DOE officials, each of these concerns will be analyzed in more detail as part of the preparation for construction of the Texas site.

In summary, while our recently-issued report identified an area for improvement and our ongoing work indicates some unresolved questions, both the Academies and DOE used the criteria established in DOE's invitation for site proposal to evaluate the proposed sites and provided evidence to support their ratings.

This concludes my summary. I'd be happy to answer any questions you or anyone else may have to ask.

[The complete statement of Ms. Flora Milans follows:]

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[35] Ms. Milans amended this sentence to read: "Finally, DOE and its contractors analyzed three concerns: fire ants, reliability of Texas' geological data and hazards to the residents from radiation."

[36] Ms. Milans amended this sentence to read: "These concerns were identified by Texas residents as part of the site evaluation and environmental impact statement process."

United States General Accounting Office
GAO Testimony

For Release
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Site Selection Process for the Department of Energy's Super Collider

Statement of Flora H. Milans
Associate Director, Energy Issues
Resources, Community, and
Economic Development Division

Before the
Committee on Science, Space,
and Technology
U.S. House of Representatives

GAO/T-RCED-89-22

89-307 263

GAO Form 160 (12/87)

Mr. Chairman and Members of the Committee:

We are pleased to be here today to discuss the Department of Energy's (DOE) best qualified and final site selection processes for the superconducting super collider. We have issued a report on the selection of the seven best qualified sites in response to a request by Senator Trent Lott and this committee. We also are completing a review of the selection of the final site in response to a request by Senator DeConcini on behalf of himself and Senators Dixon, Levin, Riegle, Simon, and Wirth.

The first request asked us to assess the fairness of the process for selecting the best qualified sites. In general, we determined that the National Academy of Sciences/National Academy of Engineering site evaluation committee used DOE's site selection criteria in their order of importance and that the process was fair. However, we recommended that, for any future site selection process similar to the super collider's, the Secretary of Energy ensure that potential site proposers be given the maximum information possible in the invitation for site proposals about the relative importance of the selection criteria.

The second request asked us to address whether the general evaluation process and the bases for the DOE site task force's ratings--and therefore, the distinctions among sites--were consistent with the technical criteria established in DOE's invitation. We briefed Senator DeConcini on this review before this hearing, and he has agreed to our discussion of the preliminary findings today before the report is issued. We found that the task force used the invitation's technical criteria to evaluate the proposed sites and, overall, provided evidence to support its ratings.

THE ACADEMIES' COMMITTEE EVALUATION

First, I would like to address our earlier review of the process for selecting the best qualified sites. As you know, our report Federal Research: Determination of the Best Qualified Sites for DOE's Super Collider, issued January 30, 1989, addresses (1) the composition of the National Academy of Sciences/National Academy of Engineering site evaluation committee, (2) the committee's use of DOE's criteria and the impact of DOE's decision not to have the committee make site visits, (3) the committee's analysis of the proposed sites' costs, and (4) DOE's review of the committee's list of best qualified sites.

In summary, we found the following:

-- The academies' 21 committee members had expertise in many diverse fields related to the site selection criteria and were geographically representative.

-- While the committee used DOE's site selection criteria in their order of importance, the DOE invitation could have provided better information about the relative importance of the regional resources criterion. In addition, committee members stated that site visits were impractical given the time constraints imposed and the number of visits that would have to be made. They also said the proposals were generally well-written and complete.

-- Sites' costs were a minor factor in the committee's identification of the best qualified sites because of the narrow percentage range of cost estimates.

-- DOE accepted the committee's best qualified list of sites on the basis of its own site task force's review of each

proposed site, the committee's report, and a briefing by the committee's staff.

Members Selected for Their Expertise

The academies' committee chairman and staff stated that 21 members were chosen for the committee to ensure that it had sufficient expertise to evaluate site proposals against each of the selection criteria. Any person associated with a proposal was disqualified. Eight members were associated with the Universities Research Association, Inc., the operations contractor for DOE's Fermi National Accelerator Laboratory, which is encompassed by Illinois' proposed site.

Evaluation Was Based on Criteria

The committee selected these seven sites using the technical and cost criteria established in DOE's invitation. The committee principally used the geology and tunneling and the regional resources criteria to discriminate between proposals. Regional resources played a greater role in the committee's evaluation than some of the site proposers had expected. In August 1987, 1 month before the proposals were due, experts, including one current and two former DOE laboratory directors, emphasized to the committee the importance of regional resources for the super collider's scientific productivity. If this information had been made available to the states in the April 1987 invitation, it might have influenced how some proposers responded to the invitation.

Costs Were a Minor Factor in Evaluation

The committee did not use costs to discriminate between the proposed sites (1) because the sites' cost estimates were within 3.3 percent of the $11.2 billion average cost of all sites to construct and operate the super collider and (2) because of

uncertainties about future costs over the super collider's 33-year life. We found no basis to disagree with the committee that the relatively narrow percentage range of cost estimates and the comparable range of the cost data's uncertainty considerably weakened its ability to distinguish between sites' expected costs. However, we noted that the committee's analysis of the sites' costs was limited because DOE did not verify the reliability of the model's data, restructure the model to allow a discounting of future costs, or reexamine the model's assumptions about the percentage of the super collider's cost components that would be purchased on national as opposed to regional markets.

DOE Accepted Committee's List

DOE's site task force members said that they reviewed the committee's best qualified list to determine whether it was supportable and reasonable, making their own assessment of the strengths and weaknesses of each of the 35 sites. Task force members did not attend subgroup or committee meetings in which the proposals were evaluated, and the committee did not give DOE a written assessment of each proposal. Consequently, task force members relied on a day-long briefing by the committee's staff to obtain information about the committee's evaluation of each site.

We also interviewed senior officials from 11 states whose proposed sites were not judged best qualified. The officials were generally satisfied with DOE's invitation for site proposals. However, if it had provided more information about the relative importance of the regional resources criterion in the site evaluation process, four officials said that they might have (1) selected alternative sites or (2) decided they did not have the regional resources to successfully compete and would not have spent between $700,000 and $2.4 million to prepare each site proposal. We believe DOE could have better indicated in its invitation the

relative importance of the regional resources criterion for the super collider's scientific productivity.

DOE'S FINAL SITE SELECTION

Now, I would like to discuss our ongoing work on DOE's final site selection process. Senator DeConcini's office asked us to provide information on whether the DOE task force (1) verified data that states submitted and considered the changes made to the draft environmental impact statement in its rating of the sites against DOE's criteria, (2) gave evidence to support its technical evaluation of each site, and (3) considered environmental and geological concerns raised by Texas residents.

Our preliminary findings are the following:

-- The task force relied on information provided by the states and verified information primarily through its site visits to the seven best qualified sites and through the environmental impact statement process. The task force assessed public comments on the draft environmental impact statement and determined that none sufficiently justified changing any of its ratings for the technical evaluation criteria. However, we noted that the task force would have had to conduct additional field studies to determine the impact of a potentially significant environmental issue at the Tennessee site.

-- Our limited analysis provided us no reason to question the decision to site the super collider in Texas. In evaluating and rating the sites, the task force used DOE's criteria and provided evidence to support its ratings. However, the task force did not provide sufficient documentation for us to (1) resolve an apparent inconsistency between its rating of Illinois as outstanding

for the geology and tunneling criterion and its estimate that Illinois would have the second highest underground construction costs and (2) determine the appropriateness of its use of a weakest-link theory to evaluate the electrical power subcriterion.

-- DOE and its contractors analyzed three concerns identified by Texas residents as part of the site evaluation and environmental impact statement processes and determined that these concerns were not serious problems. According to DOE officials, each of these concerns will be analyzed in more detail as part of the preparation for construction at the Texas site.

The Site Evaluation Process

Before discussing our observations about DOE's evaluation further, I would like to cover what the task force did to evaluate the sites during its preferred site evaluation process. The DOE task force evaluated and rated each of the seven best qualified sites on the basis of information that the states provided in their site proposals and subsequent submissions. The task force verified these data through 4-day visits to each site; discussions and correspondence with officials from federal, state, and local governments, public utilities, and other organizations; and information obtained through the environmental impact statement process.

We interviewed senior state officials responsible for each of the seven proposals to identify potential problems and concerns with the site selection process and the task force's evaluation of the sites. We found that while officials representing the seven sites were generally satisfied with DOE's overall process for gathering and verifying data, officials of four states expressed concern about the timing of the site evaluations in relation to the

environmental impact statement process. DOE task force members acknowledged that the final environmental impact statement assessment changed in some significant areas for several states. Additional environmental data were collected after the task force initially evaluated and rated the technical criteria for the sites. However, according to task force members, they subsequently examined these data and the revised assessments of the potential environmental impact for each site and concluded that the information did not justify changing any criteria or subcriteria ratings.

The Task Force's Evaluation

Our limited analysis provided us no reason to question the decision to site the super collider in Texas. We found that the task force evaluated and rated the proposed sites in accordance with the technical and cost criteria, and provided evidence to support its ratings. In addition, the chairman of the National Academy of Sciences/National Academy of Engineering site evaluation committee told us that Texas was a very good site. The chairman found no glaring inconsistencies between the task force's and the committee's evaluations of the sites.

However, the task force did not provide sufficient documentation for us to resolve the following:

-- First, the task force rated Illinois outstanding overall for the geology and tunneling criterion even though its life-cycle cost estimates for the seven sites showed that Illinois was the second most costly site for underground construction and substantially more costly than three other sites that had lower ratings. Geologists associated with the site selection process said that the geology and tunneling criterion reflected practical concerns about construction costs, schedule delays, and risks associated

with uncertainties. The chairman of the task force's geology and tunneling subcommittee said that Illinois' higher costs reflected mainly costs associated with deeper tunnel shafts that would pass through water-bearing rock, rather than the tunnel construction. He also noted that the cost estimate did not consider contingency factors for each site, which for Illinois would be minimal because of its excellent geological database.

-- Second, to evaluate the electrical power subcriterion, the task force used a weakest-link theory, which maintained that the quality of the sites' power service was only as good as the weakest link in the electric power factors that the task force considered. This resulted in a rating of good for all of the sites in this subcriterion. Alternatively, as it did with the other technical criteria and subcriteria, the task force could have weighted the electrical power factors and differentiated between states on the basis of its ratings for the more important factors.

-- Third, from public comments on the draft environmental impact statement, the task force and contractor personnel received significant information about networks of underground caves that are located in the northern part of the Tennessee site. This information raised questions about the super collider's environmental impact at the site because little is known about whether the cave network at the site and further downstream is a sensitive habitat for any threatened or endangered species. While the task force decided not to change any of its ratings for Tennessee on the basis of this information, some task force members and contractor personnel expressed concern that the caves could pose greater environmental and construction problems than expected at the Tennessee site.

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Concerns of Residents Near the Texas Site

Residents living near the Texas site identified concerns about the hazards posed by fire ants, the reliability of Texas' geological data, and the potential hazard to nearby residents from increased levels of radiation exposure. DOE and contractor officials told us that they had considered these issues and had not identified any significant problems. They noted, however, that DOE will examine these issues further in the supplemental environmental impact statement and as DOE does more core hole drilling to characterize the Texas site more completely. In addition, according to officials from four power utilities that service fire ant-infested areas in the United States, fire ants have not caused any major power outages in their systems and they would consider fire ants a nuisance rather than a serious hazard to the super collider's workers and its electric power supply.

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In summary, while our recently issued report identified an area for improvement and our ongoing work indicates some unresolved questions, both the academies and DOE used the criteria established in DOE's invitation for site proposals to evaluate the proposed sites and provided evidence to support their ratings.

This concludes my statement, Mr. Chairman. I would happy to answer any questions that you or other Committee Members might have.

BIOGRAPHY

Flora Milans is Associate Director, Energy Issues, in GAO's Resources, Community, and Economic Development Division. She joined the General Accounting Office in 1975 and has spent most of her career reviewing Department of Energy programs. From 1971-1975 she was a survey statistician in the Outer Continental Shelf leasing program of the Department of the Interior's Bureau of Land Management. From 1967-1971 she was involved in producer rate regulation in the Federal Power Commission's Bureau of Natural Gas.

Ms. Milans holds a B.S. in Mathematics from Wake Forest University. She is a member and past Chair of the National Capitol Section of the Society of Petroleum Engineers and a committee chair and active member of the Federal Executive Institute Alumni Association.

Mr. VOLKMER. Thank you, Ms. Milans. We've done it in under seven minutes.

With that, we are going to go vote and return. And we will proceed with the questioning at that time.

We now stand in recess for approximately 10 minutes.

[Recess.]

Mr. VOLKMER. Ms. Milans, it appears from your testimony that the largest criticism that GAO has is that the task force really didn't supply you in certain areas with information that you felt desirable in order to make an intelligent decision, or a criticism or critique, anyway.

Is that correct?

Ms. MILANS. That's correct. I think, in order to meet the Senator's time frames, our analysis was constrained as to what we could resolve in our minds. What we couldn't—this [37] is not on the order of something that we have a recommendation on at this point.

It is an unresolved question.

Mr. VOLKMER. I can understand that. It appears that the National Academy of Sciences had several full months to make their recommendations. The task force had about a year to do theirs.

What did you have? About three weeks? Four weeks?

Ms. MILANS. I guess we had a couple of months.

Mr. VOLKMER. That's not sufficient time, especially to go through all the material.

In your review, were you able to identify any member of the Academy committee with any conflict of interest?

Ms. MILANS. We looked at conflict of interest in our first report. We noted that a handful of members were associated with the University's Research Association. We did not determine that this was a conflict of interest.

And if I may ask Mr. Cheston if he has any further details on that?

Mr. VOLKMER. Yes.

Mr. CHESTON. The Academies themselves screened the potential candidates to serve on the committee for conflict of interest. We were specifically concerned about the University Research Association because they are the operating contractor for Fermilab.

We did note that some of the members were associated because they were high-energy physicists. As Dr. Kasper had pointed out, they had worked at Fermi; they were associated with accelerator design. So there was an involvement there.

But we did not feel, or find really, that there was a conflict of interest.

Mr. VOLKMER. Thank you very much.

The last question I had—you may or may not be able to answer this question. If you can't, because of the paucity of information, just say so.

The Department task force, did it have sufficient knowledge of the Academy's best qualified sites when it recommended that DOE adopt that list unchanged and work from that list?

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[37] Ms. Milans requested deletion of "this."

Ms. MILANS. I believe that DOE had a full day briefing from the Academy's staff. Whether in fact it had enough information is a value judgment, but it clearly had a full day briefing and access to the Academy records.

Is there anything you want to add?

Mr. CHESTON. I would also add that the task force, in its process, went through a familiarization effort while the Academy was reviewing the proposals. The task force mainly identified strengths and weaknesses; they did not make their own evaluation. The evaluation was left for the Academies for DOE review and final selection on this decision.

Mr. VOLKMER. Thank you. We have additional questions to submit to you in writing. I'd appreciate receiving those replies, if we can, within 10 days.

Thank you very much. I appreciate your being here, Ms. Milans.

Our final witness and our final panel is Dr. S. Bradleigh Vinson, Professor of Entomology at Texas A&M University. And I guess we're going to talk about fire ants, right?

Okay, Dr. Vinson.

STATEMENT OF DR. S. BRADLEIGH VINSON, PROFESSOR OF ENTOMOLOGY, DEPARTMENT OF ENTOMOLOGY, TEXAS A&M UNIVERSITY, COLLEGE STATION, TX

Dr. VINSON. If it's all right with you, Mr. Chairman, I'll kind of summarize my results.

I'm here to discuss the fire ant situation and bring you up to date on the fire ant. The imported fire ant presently infests nine States, either wholly or partly, plus part of the island of Puerto Rico. It's also been found in several other States—California, Arizona and Oklahoma.

I won't go into detail right at the moment, as I said, but I'll just try to address the three issues that have been of interest to this Committee.

That is, the potential impact of the imported fire ant on the super collider. There are three issues as I understand them.

One is that the fire ant might have some impact on the construction of the super collider.

Secondly, impacting the structure itself underground or portions of it.

And the third being the impact on the control and electrical equipment.

Let me just address very briefly those three issues.

The first is the construction situation. Certainly, the fire ant is a problem in some regions of the United States where it occurs. It is something that is of concern to a lot of people there. It will cause some problems. That is, some people will be stung during the construction process, and even living there. Everybody living in the southern areas of the United States has dealt with fire ants. In some areas for 40 years, and some for less than that. I'm saying the fire ant is a problem of concern, but has not stopped construction in any areas of the United States where the fire ant occurs already. So it's not a serious problem.

The second issue is impacting the underground equipment—the super collider itself on this issue. Fire ants basically are surface organisms. They tend to live on the surface. They will go underground maybe a hundred meters or so, but certainly not to the depth that we are talking about.

Mr. VOLKMER. A hundred meters is quite a distance.

Dr. VINSON. I didn't mean a hundred meters. A hundred feet.

Anyway, that's under very rare circumstances they might do that. We're really talking 10 feet or so down.

Even if they got down that far, I doubt they would have a serious impact going through the cement and everything else that's dealing with the super collider. So I don't feel it's a very serious problem for the fire ant on the super-structure itself.

We have found that fire ants are attracted to electrical currents, to electric fields around electrical equipment. But, again, that can be dealt with. That is, they can be sealed. Insecticides can be placed in critical places, so I don't think it's a serious problem.

With that, I'll leave it open for questions.

[The complete statement of Dr. S. Bradleigh Vinson follows:]

TESTIMONY OF

Dr. S. Bradleigh Vinson

Professor of Entomology
Department of Entomology
Texas A & M University
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April 5, 1989

IMPORTED FIRE ANT

The imported fire ant was accidentally introduced into the Mobile, Alabama area in the 1940's from South America. The ant rapidly spread and today infests all or part of nine southern states (Florida, South Carolina, North Carolina, Georgia, Alabama, Mississippi, Arkansas, Louisiana, and Texas) and the island of Puerto Rico. Infestations have also been reported from California, Arizona, and Oklahoma. The movement and spread are provided in Appendix 1 (W. P. MacKay and S. B. Vinson - The spread of the red imported fire ant in the United States and its pest status and control in electrical equipment). The imported fire ant entered Texas in 1957 and presently 125 of the 254 counties of Texas are considered infested. These counties are provided in Appendix 2 (B. Drees and S. B. Vinson - Fire Ants and Their Control).

Fire ant infestations are present in the Ellis Co. Texas area and the density of their mounds vary from none or a few per acre to over 100. We have areas in Texas where imported fire ant mound populations reach 500 per acre (due to the multiple queen form of the ant which also occurs in several other infested states).

In areas that have high densities of ants (for example, Bryan/College Station) roads, bridges, shopping centers, homes and other construction activities are undertaken and completed in a routine manner. While some construction workers may be stung, being stung by fire ants in the Southern infested states is a common hazard that certainly deserves more attention. I do not wish to minimize the imported fire ant problem as it is serious and impacts the lives of most people living in the ever expanding imported fire ant infested region. The imported fire ant is also a serious threat to the

environment, threatens the existence of many species of animals and impacts agriculture, as well as, the communication network and electrical power systems of modern society. However, the imported fire ant can be managed in specific situations where such control is essential.

There appears to be three major concerns in regard to the Super Collider:

1) The impact of the imported fire ant on the construction of the Super Collider.

2) The potential that the imported fire ant will reach and contaminate the underground part of the Super Collider.

3) The imported fire ant will impact the electrical power and equipment connected with the Super Collider.

I will present some information relative to each problem followed by my assessment of the problem and then provide possible approaches to a solution of each problem.

1. Impact on Construction of the Super Collider:

The imported fire ant builds earthen mounds that are about one foot high and 1 1/2 foot in diameter, which can harden in dry summer clay soils. Mound densities in single queen colony areas may reach 50 per acre, but over 400 can be found in some multiple queen colony areas. Mounds may contain several hundred thousand ants that range from 2 to 8 millimeters. These worker ants can sting several times and inject an alkaloidal venom that usually results in a skin pustule forming at the sting site within 24 hours. Some people are allergic and life-threatened by a fire ant sting.

While some risk of fire ant stings to construction workers exists, these risks extend to most construction activities throughout the imported fire ant

infested region. These risks have not prevented construction activities in the infested status. Further, as shown in Appendix 2, there are a number of products that can be used for fire ant control, if necessary.

2. The mound and activities of the imported fire ant generally occur near the surface although mounds encompass a network of tunnels that may extend underground several meters and subsurface tunnels that can extend out from the mound over 20 meters. While fire ants can locate cracks and can chew through plastic liners, they are not able to chew through concrete. Further, fire ants rarely penetrate the ground deeper than 10 feet. Construction of the main portion of the Super Collider is below 10 feet and such distances from the surface habitat should eliminate any problem of fire ants seriously impacting the structure. In addition, the thick concrete and presumably plastic liners used to retard humidity should be an additional, effective barrier to the fire ant.

3. Fire ants have been found to be attracted to electric fields over short (centimeter) distances. The attraction occurs with both AC and DC current and increases as the voltage increases from 5-10 volts up to 150 volts (the highest we have tested). As shown in Appendix 1, every ant species we have tested (nine in three separate subfamilies) are attracted to electric field between 50 and 120 volts (highest tested in this study). Problems of ants in electrical equipment has been reported on three other continents (Appendix 1) and appears to be a general phenomenon.

Our research has shown that many problems of ants in electrical systems can be eliminated by sealing relays and junctions and other circuitry that is susceptible to ant problems. Insecticides can be effectively used in some situations and in others the equipment can be placed well away from moist

enclosed spaces conducive to fire ant nests, thus reducing the ants encounter with the equipment.

While the imported fire ant remains a serious problem to people in both urban and rural environments and is a threat to agriculture, wild life, domestic animals and can threaten the functioning of some of the technologies of society; the fire ant can be managed in select situations. Ants could cause some difficulties with the super collider, but these can be effectively dealt with. The problem of the fire ants with the super collider is minimal; the fire ant problem with regard to the environment, wild-life and the quality of human life in infested regions is a major concern.

Respectively Submitted by:

Dr. S. Bradleigh Vinson
Professor of Entomology
Texas A&M University

THE SPREAD OF THE RED IMPORTED FIRE ANT IN THE UNITED STATES AND ITS PEST STATUS AND CONTROL IN ELECTRICAL EQUIPMENT

William P. MacKay and S. Bradleigh Vinson

Department of Entomology, Texas A&M University, College Station, Texas 77843

ABSTRACT: The imported fire ant (Solenopsis invicta Buren) has caused numerous problems since its introduction into the United States in the 1940's (1). One of these problems has been the invasion and destruction of electrical equipment (2). Other species of ants also destroy electrical equipment (3). We have been working on this problem for several years, as part of our program on the imported fire ant.

We are attempting to determine the factors which attract ants to electric circuits. We have investigated the effects of a number of factors on the imported fire ant, including various AC frequencies, ozone, magnetic fields, electric fields and the insulation on wires (4). We have found that only electric fields attract ants. Other ant species occasionally invade such equipment, but their effect is usually not substantial due to the lower population densities in urban environments.

Fortunately the problem of fire ants in electrical equipment is easily solved as nests do not have to be eliminated. Ants must be simply excluded from the equipment physically or with insecticides.

Introduction

The imported fire ant, *Solenopsis invicta*, was accidentally introduced into Alabama in the 1940's from South America. It rapidly spread, entering Texas by 1957 (Fig. 1) where it continues to spread at an exponential rate. Control and eradication programs of the ant have had little success. The ant is expected to infest much of the southern United States, being limited only by cold temperatures and dry desertic conditions. Infestations have been discovered in Arizona (Tucson and Phoenix) and California (Santa Barbara).

The fire ant causes a number of problems ranging from anaphylatic shock and death of people, domestic and wild animals, feeding on and destruction of crops to shorting of electrical equipment. The impact of fire ants on electrical circuitry can be divided into two problems: 1) ants cause short circuits in wiring and electric equipment, and 2) ants enter mechanical devices and disrupt service by interfering with the mechanism. Each of these problems must be dealt with using somewhat different methods, each of which are discussed below.

Shorting electrical circuitry is one of the major problems caused by fire ants. Fire ants remove insulation from wires, causing a short circuit when the wire becomes grounded. Laboratory and field tests have shown that there

Figure 1a. Distribution of the Fire Ant in 1950.

Figure 1b. Distribution of the Fire Ant in 1966.

Figure 1c. Distribution of the Fire Ant in 1976.

Figure 1d. Potential Distribution of the Fire Ant.

Figure 1. Distribution of the Fire Ant in the United States.

is no component in the insulation of various types of wire which attracts ants, but that apparently ants only attack wire when it is carrying an electrical current. Ants also bridge contacts on terminal blocks, causing short circuits or crossed lines. The bridging of contacts has been a particular problem for the telephone companies when ants nest inside telephone company pedestals and disrupt signals. Fire ants also nest inside transformers, particularly on the high voltage side. Ants even invade cars and airplanes and can result in the abortion of flights when pilots become covered with ants during takeoff or accidents on the highway when drivers are stung.

The second major problem caused by the imported fire ant is the interference with the operation of electrically operated mechanical devices. The homeowner is plagued with the ants in relay switches of air conditioners, and in electric meters. The rural land owner finds fire ants interfering with water pumps, electric fences and other electrical farm equipment. Cities suffer invasions of ants into traffic signal control cabinets, which may cause malfunction of the signal. Ants cause most problems in electrical equipment when they invade relay switches that generate electrical fields.

Ants have been found in switches and other electrical equipment for a number of years, although the attraction mechanism has been unknown. This phenomenon has been observed in *Technomyrmex albipes, Lasius alienus, Vasmannia* spp. and *Solenopsis* spp. (3), as well as ten species of ants discussed in this report.

Results

Fire ants are strongly attracted to both AC and DC electric fields (Fig. 2). Attraction is proportional to voltage. There is no significant difference between the attraction of AC and DC voltage (*5*).

We found that nine other ant species (three separate subfamilies) are also attracted to electric fields. The subfamilies and species are as follows: Myrmicinae - *Solenopsis geminata, Crematogaster*

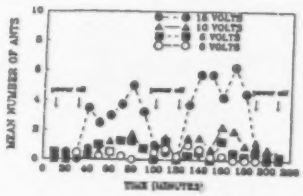

Figure 2. Effect of Various Voltages on the Fire Ant.

punctulata, Pogonomyrmex barbatus, P. comanche, Tetramorium caespitum, Pheidole hyatti, Monomorium minimum; Formicinae - *Formica pallidefulva*; and Dolichoderinae - *Forelius foetidus*.

These species are strongly attracted to both AC and DC electric fields (Fig. 3). Attractiveness increases with an increase in voltage. Some species (*P. comanche, Ph. hyatti*) show little or no response to voltages lower than 50 volts. Responses in many other species do no increase greatly until the voltages reach 60 volts. There appears to be no difference between AC and DC generated fields in regards to the attraction of ants, although ants leave AC powered points at a slower rate. Ants of all three subfamilies responded in a similar manner.

This attraction is a serious problem as ants can cause considerable destruction of electrical equipment. Fortunately ants are relatively easy to control in electrical equipment as nests usually do not have to be eliminated. We have found two methods are very successful in controlling ants in electric circuits. The first involves the physical exclusion of ants from the circuitry by sealing the attractive components. The second involves the exclusion and destruction of the ants using insecticides. Both methods can be used concurrently to insure the protection of the equipment.

The first solution involves physically preventing the invasion of the ants into the component. These solutions can often be simple. Terminal protectors are used by the telephone company to prevent shorting between lines. Relay switches which are contained in plastic or metal boxes can be easily sealed so that ants can not enter. We

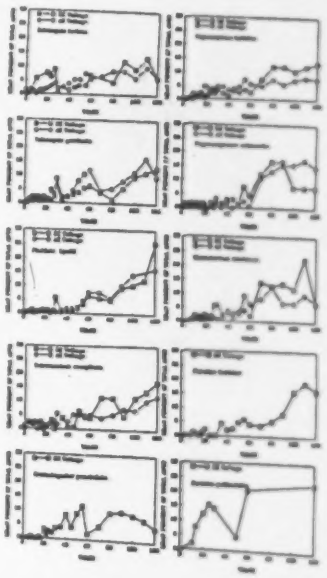

Figure 3. Effect of Electric Fields on Ten Species of Ants.

have found Devcon 5 minute epoxy to be very effective. It is important to seal the relay from both the inside and outside, especially around any pins which pass through the base.

The second solution involves the use of insecticides. We have tested a number of insecticides and found that chlorpyrifos (0.5% active ingredient) in a corncob grit is the most effective compound.

Results of both sealing relays and treating circuitry with insecticides have been very successful (Fig. 4). Powered relays which are not protected either with insecticides or by sealing the relays, accumulate large numbers of ants throughout a single season. Powered relays which

are sealed or are in cabinets treated with insecticides accumulate few or no ants during the season.

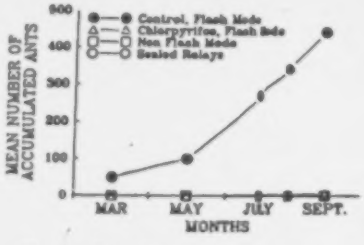

Figure 4. Control of the Fire Ant in Electric Equipment.

Discussion

It appears that ants are able to detect, and are attracted to electric fields. We determined this to be true in 10 species of ants in three separate subfamilies. Probably the same phenomenon is responsible for the attraction of several other species of ants to electrical equipment. The fire ant appears to be the principle problem simply because the density is higher in many urban environments than that of other ant species. The successful solution to the problem of fire ants in electrical equipment involves a two-pronged attack: physically preventing ants from entering components and the use of insecticides to exclude and destroy the ants.

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6. We thank Dr. Sanford Porter for providing many of the species tested, Dr. Les Greenberg for computer assistance, and Emma MacKay for a critical review of the manuscript. The research was supported by the Texas Department of Transportation and Public Safety, project # 2-18-86-1135.

B-1536

Texas Agricultural Extension Service

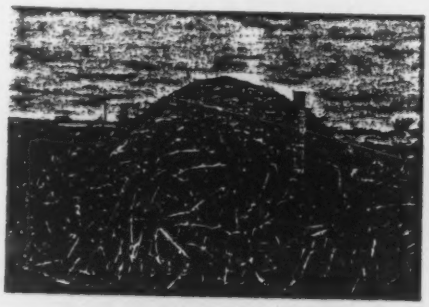
FIRE ANTS AND THEIR CONTROL

Bastiaan M. Drees and S. Bradleigh Vinson*

Fire ants are of tremendous concern to Texas citizens. Relatively mild winters and other environmental conditions contribute to their increase in Texas. Red imported fire ants are now found in more than 125 counties from south Texas to north central Texas. Counties infested as of 1988 are shown on the map in Figure 1.

Figure 1. The area of Texas infested by red imported fire ants.

Red imported fire ant workers marked for research purposes.



Red imported fire ant mound.

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Identification

Four fire ant species are found in Texas. Three are native to the state. The Tropical fire ant, *Solenopsis geminata* Fabricius, and the southern fire ant, *Solenopsis xyloni* McCook, are the most common native species. The desert fire ant, *Solenopsis aurea* Wheeler, is a rarely observed native species. The red imported fire ant, *Solenopsis invicta* Buren, causes the most concern.

Distinguishing between imported and native species is difficult, and positive identification should be made by specialists familiar with all species. Although species can be identified from single specimens, we recommend that samples sent in for identification contain 40 or more randomly collected workers. The best collection container is a small vial or jar containing alcohol or coated inside with talcum powder (fire ants cannot walk up smooth surfaces treated with talcum powder). The jar is pushed into the mound for 10 to 15 minutes, then removed (alcohol added, if needed) and capped. Care should be taken to avoid being stung. Contact your county Extension agent for information on submitting specimens.

Medical Importance

Fire ants can sting repeatedly and will attack anything that disturbs their mounds or food sources. Symptoms of the red imported fire ant sting include burning and itching, followed by development of a white sore or pustule that may leave a permanent scar. Venom of the imported fire ant is unlike that of other stinging insects. Some persons are hypersensitive to this venom and may suffer chest pains or nausea or lapse into a coma from one sting. Persons reacting severely to fire ant stings should see a physician immediately, and those who are hypersensitive should see an allergist for treatment if fire ant contact is a possibility.

Biology

Details concerning the life history of and problems with the imported fire ant are provided in the Texas Department of Agriculture and Texas Agricultural Experiment Station cooperative publication, "Imported Fire Ant: Life History and Impact on Man." An abstract of the ant's biology is presented here.

The ant colony consists of the brood and the adult castes. The adult castes include a queen, winged males, winged females and workers. Worker ants (females) are wingless, sterile and differ in size. The largest forms are referred to as "major workers," the medium sized as "media workers," and the smallest as "minor workers." Older workers forage or defend the nest while younger workers care for the developing brood. The brood is made up of eggs, larvae and pupae of all the castes.

The virgin, winged forms live in seclusion inside the mound until it is time to leave the colony and begin their mating flight. Both sexes fly directly from the mound surface. Once airborne, the males and females fly out of sight and mate in flight. The males die soon afterward while the fertilized queens alight, find suitable nesting sites, shed their wings and begin digging underground chambers in which to lay eggs.

The queen lays a cluster of a dozen or so eggs and then watches them almost constantly. When the eggs hatch in 7 to 10 days the helpless larvae derive food from the queen's body, either from liquids she regurgitates or from eggs that she lays. Later the queen lays a cluster of 75 to 200 eggs per day and the larvae receive food gathered by the workers produced earlier. The larvae pupate in 6 to 10 days and adults emerge in 9 to 15 days. Mound building by newly established colonies is not conspicuous for several months after the young queen initiates egg laying.

Historically, each mound was thought to contain a single queen. Recently, however, populations of red imported fire ants have been detected that contain many reproductive queen ants. These are called "multiple queen" colonies. In areas where this type of ant exists, the number of mounds per acre ranges from 200 to 400 mounds rather than 40 to 60 mounds per acre. Furthermore, worker ants freely move from one mound to another and do not display territorial behavior.

The imported fire ant spreads naturally through mating flights; however, the queens also spread by crawling, drifting downstream on or in logs, or traveling aboard cars, trucks or trains. Shipments of nursery stock or soil from an infested area may relocate an entire colony or nest.

The average colony contains 100,000 to 500,000 workers and only a few dozen to several hundred winged forms. The winged forms are most prevalent in the spring and early summer, decreasing in mid and late summer but increasing again in the fall. A colony can produce as many as 4,500 of these winged reproductive forms during the year. The mating flights can occur year round, but are most frequent in April, May and June, and usually follow a rain. Flights in late fall or early winter also occur in the warmer areas along the Gulf Coast.

Imported fire ants build mounds in almost any type of soil but prefer open, sunny areas such as pastures, parks, lawns, meadows and cultivated fields. Mounds are less well developed in very sandy soils. Often mounds are located in rotting logs, around stumps and trees in open areas and occasionally under buildings. Mounds constructed by the imported fire ant may vary in size depending upon soil characteristics and land disturbance, but mounds can reach 10 to 12 inches in height.

Control Tactics

Red imported fire ants are a pest of man, animals and several agricultural crops. Currently there is no single, universal solution to the fire ant problem. However, there are a number of options available. Before attempting any control measure, consider all of the available methods for achieving the most satisfactory results. Not controlling fire ants is one option, particularly where they do not directly interfere with man or man's activities. In areas where the imported fire ant is not widespread, individual mound treatment is recommended because this form of treatment does less damage to native ants that slow the spread of the fire ant. Insecticidal products registered for fire ant control usually are labeled only for certain treatment sites. The techniques for applying these products also vary with the treatment sites. Care must be taken to select the best combination of control agents and application methods in each situation to attain optimum results.

The Non-Control Option - Why consider it?

In areas where fire ants are not causing a problem, it may be best not to attempt any control measures. The reason is that a unit area, such as an acre of land, will support only a limited number of fire ant colonies. These may be in the form of a few large mounds or a large number of small ones. A few large mounds consume as much energy (food) from the environment as many smaller mounds. Established ants defend territories, preventing the establishment of new colonies in their territory. Maintaining several large, stable colonies in locations that do not interfere with the activities of man may be an ecologically sound method of stabilizing the fire ant population in certain areas.

Home Remedies

A large number of "home remedies" have been used or proposed. These are not recommended but are presented here for information only. While these methods often appear to work, they rarely control the ant. Usually the ant colony simply moves to a new location, or the queen and a few workers remain hidden underground.

Gasoline or other petroleum products have been most widely used, and sometimes kill fire ant colonies. This practice is not recommended by the Texas Agricultural Extension Service because these substances are dangerously flammable, kill grass and plants around the treated mounds and can seriously pollute the soil.

Other home remedies include soap solutions, cleaning products or wood ashes soaked into the mound, all of which are supposed to remove a protective oil coating from the ants. The use of battery acids, bleaches or ammonia products is extremely dangerous. All of these products are generally ineffective, dangerous and potentially serious pollutants.

Another technique is the sprinkling of grits on the mounds. The theory is that after ingestion by the fire ants, the grits swell and rupture the ants' stomachs. No scientific research supports this claim. In fact, only the last stage of the developing fire ant is known to ingest solid food. All other life stages feed only on liquids, sugary solutions or greasy materials.

Substances released from crushed or grated citrus peels have been reported to be toxic to fire ants, as are other natural substances. However, until proper techniques for applying these naturally occurring chemicals have been developed they are likely to be ineffective.

Non-Chemical Control Methods

Fire ants can be suppressed by several non-chemical control techniques. These may be appropriate in certain situations.

A mound can be dug up and moved or dispersed. When disturbing mounds with implements, care must be taken to prevent fire ants from attacking by crawling up the handle of a shovel or out of a bucket. Talcum powder, liberally dusted on handles and the inside of a bucket, will deter fire ant movement across the dusted surfaces.

Boiling water is reportedly a fairly effective treatment for individual fire ant mounds. Approximately 3 gallons of hot water poured on each mound will eliminate about 60 percent of the mounds treated. Surviving mounds will need to be treated again. This method may work well in certain situations, but care must be taken not to pour hot water on desired plants. Exercise care in handling large volumes of hot water to prevent serious burns.

When mounds are regularly disturbed by tilling or cultivation colonies may move. Knocking down mounds by dragging a heavy object across a field lowers mound heights temporarily and also may cause colonies to move. However, these methods do not eliminate the ants.

Because ants are generally territorial, shoveling one mound on top of another or knocking down mounds in a field has been considered as a method of forcing colonies to "fight each other to the death." However, some fire ants, particularly the multiple queen type, are tolerant of ants from neighboring mounds.

Biological Control

There are a number of organisms that kill newly mated fire ant queens. These include dragon flies, other ants, birds, lizards, spiders and toads. Animals that eat ants, such as armadillos, may disturb the

mound and eat some workers but are not really useful in control. Some parasites are known to attack ants. One such organism has been marketed for fire ant control. This parasitic mite feeds on and kills developing fire ants by injecting a poison. Death of the colony is slow and effectiveness of this treatment has not been determined to be effective. Because these mites can also attack people, causing rash-like symptoms, care must be taken to avoid skin contact with them. Currently, research is evaluating the effects of parasitic nematodes on fire ant mounds.

Control Devices

Devices that do not use insecticides do not require labelling by the Environmental Protection Agency, and are often marketed without being scientifically evaluated for effectiveness. The existence of a "control" device on the market does not indicate that the device is effective. These products often will kill some ants, but they may not be capable of eliminating a colony. The Federal Trade Commission may be contacted to report deceptive trade practices.

Mechanical and electrical products are sometimes marketed for fire ant control. Among these is a device which electrocutes fire ant workers as they approach an electric grid inserted into the mound. Several hours may be required to substantially reduce numbers of fire ant workers. The effectiveness of this device in killing a mound has not been scientifically determined.

Other devices have been marketed from time to time, including microwave units, electrical probes and explosive elements to heat, electrocute and/or blow up mounds. Most of these devices are expensive, labor intensive, not scientifically validated and of questionable value.

Attempts have been made to freeze ants with cold carbon dioxide or liquid nitrogen. Both methods kill some workers and may sometimes kill a colony; but ants often can withstand being frozen for short periods of time.

Chemical Control Techniques

Chemical applications can be aimed at the foraging worker ants and/or at the entire colony. Available techniques include *surface applications* using paints, sprays or dusts; *individual mound treatments* using drenches, granular products, dusts, methyl chloroform, aerosols or baits; and *broadcast applications* of insecticide liquids, granules or baits using granular applicators, high volume sprays and electric or mechanical spreaders. For a list of products, see Table 1.

Surface applications. Many products containing carbaryl, chlorpyrifos, diazinon, propoxur and resmethrin are labeled for indoor and/or outdoor use as spot treatments for ant trails and for ant colonies located in wall voids. They are generally formulated as dusts or sprays, although several products contain chlorpyrifos mixed into a latex-based paint. Except when used to treat colonies located in wall voids, these products are intended only to reduce the number of foraging worker ants; the colony where ants are developing is not *directly* affected. These products can be used to produce barriers and protect items or areas where foraging worker ant activity is not wanted. For a more detailed discussion about these methods refer to L-1783, "Carpenter Ants," L-1222 "Texas Leaf Cutting Ants" and L-2061 "House Infesting Ants," available from the Texas Agricultural Extension Service.

Individual mound treatments - Mound drenches (Figure 2). Most fire ant control products on the market are formulated as liquid concentrates. A few are available as ready-to-use formulations. Each product contains a certain concentration of insecticide which may need to be diluted in the amount of water specified on the product's label. Be careful in handling the concentrate and avoid contact with it. Mix the proper amount in a gallon container such as a sprinkler can or plastic jug with holes drilled in the screw-on cap. Do not use a container which may be readily identified with a food product. Plainly mark the container "POISON." Do not use the container for any other purpose and destroy it after use. Sprinkle the solution on top of and around the mound gently without disturbing the colony. Mound drenches generally do not kill ants immediately and may require several days to be effective.

Figure 2. Mound drenches.

Granular products. Several products contain insecticides formulated as granules to be applied to individual mounds at the rate specified on the product's label (Figure 3). To treat a single mound, measure the recommended amount in a measuring cup and sprinkle it on top of and around the mound. Do not disturb the mound. Then, using a sprinkling can or a gallon plastic jug with holes drilled into the screw-on cap, water the mound gently, trying not to disturb the colony. Several days may be required before the entire colony has been killed.

Figure 3. Granular products.

Dusts. Some products, such as those containing acephate, are specially labeled for dusting individual fire ant mounds. Evenly distribute recommended rates of the powder over the mound. The mound should be eliminated within approximately one week.

Liquid fumigant. Methyl chloroform, or 1,1,1 trichloroethane, is a liquid that rapidly volatilizes into a heavier-than-air gas (Figure 4). Using a stick or similar object, make a hole in the top of the mound to be treated. Measure the recommended amount of liquid as specified on the label (which depends upon the size of the mound), and pour the liquid in the hole and around the top of the mound. The gas sinks into the mound and kills ants immediately. Ants foraging outside of the mound at the time of treatment will not be affected. Plants around the treated mound may be injured. While 80 to 90 percent control may be expected, the product is not as effective when the ground is excessively wet or very dry.

Figure 4. Methyl chloroform.

Application of other liquid fumigants such as vaporized resmethrin (Earthfire®) and methyl bromide (Brom-O-Gas®), a restricted use pesticide, requires special equipment and training. These materials are to be used only by trained personnel and are not intended for general use.

Injectable products. Products containing pyrethrins or chlorpyrifos are manufactured in special aerosol containers to which an injection rod can be attached (Figure 5). The rod is inserted into the mound in a number of places according to instructions on the label, and the pesticide is injected for a specified time into each mound. Smaller mounds may require less insecticide. Products containing pyrethrins immediately kill ants in the mound. However, foraging workers outside the mound are not affected. These products are more expensive and time consuming to use, but tend to be effective more rapidly than mound drenches. Special equipment (a pressurized sprayer with a specially designed probe) is required to apply a product containing petroleum distillates, Cotton's Fire Ant Killer and PT® 270 Dursban® (chlorpyrifos).

Figure 5. Injectable products.

Bait formulations. Several products contain pesticides formulated on a bait of processed corn grits coated with soybean oil. These products are applied around individual mounds or to larger areas at rates specified on the product labels. Baits should be applied when worker ants are actively foraging. This can be determined by leaving some greasy food (e.g. tuna fish, peanut butter) near a mound and checking it for fire ant activity or observing ant trails around mounds when temperatures exceed 70 degrees F. During hot summer days, the worker ants forage during the night and are inactive during the day. In most situations, baits should be applied in late afternoon or early evening.

To treat individual mounds, sprinkle the recommended amount of product around, but not on, the undisturbed mound (Figure 6). Bait can be sprinkled up to 3 feet away from the mound. Depending on the active ingredient, several days to many weeks may be required to eliminate the mound's ant population using the rate recommended for treating individual mounds. Since soybean oil becomes rancid and less attractive to worker ants when stored improperly, treat as many mounds as possible soon after opening the container. Seal unused portions tightly in the container and store in a cool, dry place away from sunlight to preserve freshness. Moisture and rain will dissolve the bait particles, so use baits only when grass and soil are dry and no rain is expected within several hours after treatment (also see Broadcast Application section).

Figure 6. Bait formulations.

Broadcast applications. Several products are labeled for broadcast application. For the control of fire ants in turfgrass, granular formulations can be applied with a fertilizer spreader or liquid formulations can be applied using a high volume hydraulic sprayer. These materials must be thoroughly watered into the soil. Granular products containing diazinon, chlorpyrifos or isofenphos are long-acting contact insecticides which primarily kill foraging worker ants and prevent small mounds from being established.

For larger areas of turfgrass, pastures, range grass and other non-agricultural land, some bait-formulated insecticides are labeled for broadcast application. Refer to the discussion of bait formulations for control characteristics and proper timing. Bait formulations labeled for broadcast application are usually applied at very low rates (0.8 to 1.5 pound of product per acre), making proper calibration extremely difficult. Furthermore, because of the soybean oil component in the formulation, the bait cannot be mixed with other materials such as fertilizer. Most applicators with rotary-type agitators cannot be used because the bait tends to "cake-up" when applied.

There are several types of active ingredients formulated as baits. Amidinohydrazone or hydramethylnon (Amdro®) kills ants injesting this product. When applied at the broadcast rate, approximately 80 percent of the mounds in the treated area will become inactive within a period of about five weeks. Active ingredients that act as insect growth regulators, such as fenoxycarb (Logic®), avermectin (Affirm®) and Prodrone®, do not affect worker ants. These materials render queen ants incapable of egg production and cause the brood to develop into non-worker ants (winged males and sterile females). Thus, reduction of mounds within the treated area is slow, requiring several months to a year before worker ant activity in a percentage of affected mounds stops. Because of the extended length of time required for these products to affect the ant population, they are not recommended for use in flood-prone areas.

Hand spreaders. To treat small areas, the least expensive applicators available are hand-powered seed spreaders such as the Cyclone Seed Sower® (Figure 7). This tool can be used while walking or riding on the back of a vehicle. The amount of bait broadcast per acre will depend upon the size of the bait particles, the setting of the flow outlet and the speed at which the applicator is moving. Thus, the application device will have to be calibrated prior to each application. The following is a general guide: At a walking pace of 2 miles per hour, and turning the crank at 40 cycles per minute, a Cyclone Seed Sower® will have a 12-foot swath and apply 0.7 pound of bait per acre at a setting of 2. When moving at 10 miles per hour, a setting of 3 will apply roughly 1.1 pound of bait per acre.

Figure 7. Hand-powered spreaders.

Electric spreaders. The Cyclone Spreader Model M-3® or applicators of similar design are preferred (Figure 8). This equipment usually has a vibrating opening plate and a rotating spreading disc or fan. Swath width can best be controlled with a rheostat. Do not apply bait with ground-driven or power take off-driven equipment. Herd's Model GT-77 ATV Logic® Broadcaster is pre-set at the factory for applying the labeled rate of material. Electric applicators may be mounted on any vehicle that will maintain a low constant speed. Follow instructions provided with the equipment to calibrate the applicator for each treatment. Slight adjustments in the flow outlet setting and condition of the bait material (particle sizes) can cause great changes in bait flow.

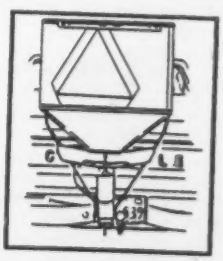

Figure 8. Electric spreaders.

Aerial application. Aerial applications of bait formulations for fire ant control on privately owned land are usually made using single engine aircraft (Figure 9). If applications are to be made by a commercial aerial applicator, the pilot is responsible for delivering the proper rate. To achieve the best results, some modifications should be made to the single engine aircraft. For a description of these modifications and calibration instructions, obtain a copy of the Amdro® fire ant insecticide information bulletin entitled *Application Equipment Information* from the American Cyanamid Company, Chemicals Division, Wayne, N.J. 07470.

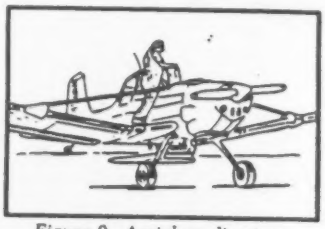

Figure 9. Aerial application.

Management Strategies

Although insecticide treatment may reduce the numbers of workers or eliminate mounds temporarily, reinfestation is likely to occur. To maintain a low number of fire ants, control programs must be carefully designed and implemented. These programs are generally more successful when treatments are repeated periodically or as needed, or when a combination of control tactics is implemented in succession. The discussion below describes *potential* management strategies for different situations.

Ornamental plantings and turf. Fire ants infest lawns, school yards, athletic fields and urban parks. Mounds can be eliminated temporarily, but when the insecticides are no longer active, new fire ant mounds will develop. Occasionally, the number of mounds that appear after the effects of the first treatment have ended is greater than the initial level, unless the area is retreated or developing mounds are treated individually as they appear.

In areas of less than 1 acre or in areas where there are a few mounds, repeated individual mound treatments (chemical or non-chemical) can be an effective program. In larger areas, an initial broadcast application of a bait, liquid or granular pesticide, followed by individual treatment of mounds after the maximum effect of the initial treatment has been achieved, may be less expensive and labor intensive than individual mound treatment alone. Some products containing isofenphos can be applied for turf pests such as white grubs. This ingredient is a long-lasting, slow-acting insecticide labeled to prevent the reinfestation of fire ants in treated areas after initial fire ant populations have been eliminated. Surface spraying with products containing diazinon and chlorpyrifos will reduce worker populations but will not directly eliminate colony development. Diazinon is no longer cleared for use on sod farms and golf courses.

Fire ant control in commercial ornamental plant and turf production requires the use of specially labeled products. Ford's Ant 2.5G Insecticide (chlorpyrifos) is registered for use in nursery bench and potting media, and Dursban 2E and 4E are registered for dipping balled and burlapped nursery stock. Dursban® Fire Ant 10% Granular Insecticide (chlorpyrifos), Dursban® 50 W and Oftanol® (isofenphos) are registered for commercial turf production. Plant material shipped outside of the fire ant quarantine area must be treated with an approved product and inspected by a representative from the Texas Department of Agriculture. Material moved within infested counties must be free of pests. Fenoxycarb (Logic®) is registered for use on commercial turf for fire ant suppression, although mounds unaffected by this product must be detected and eliminated using some other method to ensure fire ant free sod prior to harvest and shipment (see discussion of Broadcast Applications).

Pastures, rangegrass and non-agricultural lands. Farm pasture land may become heavily infested and contain some large mounds. In the hot summer sun, these mounds may become hard and can damage farm machinery. Fire ants also can attack young livestock, wildlife and ground nesting game birds.

Dragging heavy objects such as railroad ties across a field will knock down tall, hardened mounds, but will not eliminate fire ant populations. Few products are labeled for fire ant control in these areas. Broadcast applications of a bait such as Amdro® or Logic® will initially reduce mound numbers. However, avoid area-wide applications if there are few mounds present (fewer than 15 mounds per acre), because the number of mounds may increase greatly after the initial treatment effects have faded. Also, nearby mating flights just before or soon after treatment may "seed" the treated area with newly developing colonies which are not affected by the bait.

Mounds also can be treated individually with materials such as acephate, chlorpyrifos, methyl chloroform or amidinohydrazone. Individual mound treatments can be expensive and labor intensive. Spray treatment with diazinon (DZN® Diazinon AG 500 or DZN® Diazinon 50 W) also will reduce numbers of fire ant workers temporarily, although entire mounds will not necessarily be killed.

When cutting and baling hay, select equipment (such as disc mowers) that can withstand the impact of mounds that may be hit. Following baling operations, remove bales from the field immediately to pre-

vent ants from nesting in them, particularly when rain is anticipated.

A quarantine is in effect which prohibits the shipment of hay from infested to uninfested counties. Texas Department of Agriculture (TDA) district inspectors are available to certify hay shipments. If hay is free of imported fire ants, a TDA Form 499 will be issued permitting hay movement from a quarantined to an uninfested county. For further information call TDA at 1-800-342-5429 (DIAL-HAY).

Homes, structures and greenhouses. Spray ant trails or spot treat ant infested areas (See Extension publication L-2061, "House Infesting Ants") and search for the colony. Nests may be located outside, in wall voids, rotten wood, potted plants or other suitable media. Amdro® is not labeled for use indoors. Colonies in wall voids can be treated with dust formulations of chlorpyrifos injected with a duster through holes drilled in the wall.

Fire ants often infest electrical housing and water meter casings. Ants can be controlled in electrical switch boxes by installing a dichlorvos strip (Vapona Pest Strip®) or by using specifically labeled products (State® Fire Ant Killer with resmethrin, Rainbow Insect Control containing chlorpyrifos, 797-A Powdered Insecticide containing synergized pyrethrins and silica gel). Use of dichlorvos or some other insecticides can adversely affect some types of circuitry or wiring. To avoid electric shock, do not use spray applications around electrical installations. Instead, carefully paint insecticide on surfaces with a paint brush. Around water meter casings, immediate control may be obtained with pyrethrin aerosols or methyl chloroform. Baits applied around these structures will provide control in about one week.

Home vegetable gardens and orchards. In home vegetable gardens, insecticides (diazinon) can be incorporated before planting for limited fire ant control. However, when ants construct a mound in the garden, control options are limited. Shoveling the mound out of the garden or using the hot water technique are non-chemical control methods, but they must be done carefully so as not to injure the plants. Few chemical products are approved for treating fire ants in vegetable gardens. Methyl chloroform may be used if the applicator is careful to not allow this product to contact plants directly. Amdro® should not be applied in the garden, but can be broadcast around the perimeter of the garden so the foraging worker ants will collect the bait and bring it back into the mound in the garden. If ants are foraging into the garden from elsewhere, protect garden plants and people by spraying a chemical barrier of diazinon or chlorpyrifos around the garden.

Currently, no products are registered specifically for use in peach and pecan orchards, vineyards and blueberry plantings. Turf areas around plantings may be treated using strategies discussed in the Ornamental Turf and Pasture, Rangeland and Non-Agricultural Land sections, and ant mounds in orchards may be treated with products approved for use in home gardens.

Poultry houses. Use a combination of the following procedures:

- Remove food sources such as trash, piled feed, broken eggs and dead chickens.
- Remove extra pieces of lumber, old equipment and manure piles.
- Remove weeds and grass from around poultry houses with mowers or herbicides.
- Treat litter with products containing carbaryl if ants are nesting inside poultry houses. Do not allow insecticides to come into contact with feed or water supplies. Read the poultry section of labels for additional precautions.
- Spray a barrier around the outside of the building with chlorpyrifos or diazinon if fire ants are foraging in from outside the poultry house. Use either a broadcast or individual mound application technique to clear mounds from the surrounding area.

Field crops. Occasionally fire ant workers feed on parts of plants or remove planted corn, peanut or soybean seeds and/or seedlings. Seed treatments or insecticides applied before or at planting to control soil insects usually may prevent fire ant damage, although these products are not specifically labeled for fire ant control. Later in the season, fire ant feeding on roots, blossoms, fruits or pods may be severe enough to justify control measures directed at eliminating mounds associated with the foraging activity. Treatments for other pests also will affect fire ant foraging. Remember that fire ants are key predators of some pests such as the boll weevil in cotton, and thus may be considered beneficial insects in field crops. Conversely, fire ants and other ant species will protect and disperse aphids because aphids produce a sugary substance called "honeydew" on which the ants feed.

Apiaries. Fire ants will invade bee hives and feed on developing bee larvae. They can destroy weakened colonies. Fire ant control around the hives must be practiced with care because the bees will be affected by insecticides.

Treat areas of ornamental turf or pasture land to remove mounds in the immediate vicinity of bee hives. Bait formulations are the safest insecticides; dust formulations should be avoided. Elevate the hives several inches on bricks or stones. The base of each hive also can be treated carefully with diazinon or chlorpyrifos to produce a barrier which foraging worker ants cannot cross. These products can be painted on the surfaces or sprayed on the ground around the hives. Apply insecticides late in the evening or early in the

morning when the bees are not active. Applications must be repeated periodically to keep barriers effective.

Safe and Effective Use of Insecticides

The user is always responsible for the effects of pesticide residues, as well as problems that could arise from drift or movement of the pesticide to neighboring areas. ALWAYS READ AND FOLLOW CAREFULLY THE INSTRUCTIONS ON THE CONTAINER LABEL.

Be sure to use the recommended amount of insecticide as specified on the product's label.

1 gallon = 4 quarts = 8 pints = 128 fluid ounces
1 fluid ounce = 2 tablespoons
1 tablespoon = 3 teaspoons
1 cup = 8 fluid ounces
1 pint = 2 cups

Proper disposal of waste pesticides and "empty" or used containers is an essential step in safe pesticide use. For additional information see Extension publication L-1088, "Disposal – Pesticide and Pesticide Containers."

Policy Statement for Making Chemical Control Suggestions

Suggestions for use of pesticides made by the Texas Agricultural Extension Service and the Texas Agricultural Experiment Station are based upon:

- Product effectiveness.
- Avoidance of residues in excess of allowable tolerances.
- Avoidance of toxicity to desirable vegetation and animals, and to humans.
- Avoidance of adverse side effects upon beneficial predators, parasites, honeybees, fish and other wildlife, plants, animals and humans.

Suggested pesticides must be registered and labeled for use by the Environmental Protection Agency and the Texas Department of Agriculture. The status of pesticide label clearances is subject to change and may have changed since this publication was printed. County Extension agents and appropriate specialists are advised of changes as they occur.

Table 1. Partial list of insecticide products registered for fire ant control.

Company name	Product name	Use*	Active ingredients (%)
American Cyanamid	Amdro®	1,6	hydramethylnon or amidinohydrazone (0.88)
	Combat® Fire Ant Killer	1	hydramethylnon (0.88)
Ant Fire, Inc.	Earthfire® Vaporizing Fluid	7	resmethrin-(1.00)
Bengal Chemical Co.	Fire Ant Killer	7	1,1,1 trichloroethane or methyl chloroform (96.75)
Banner Labs, Inc.	MC 98® Fire Ant Killer	7	methyl chloroform (96.00)
Black Flag	Fire Ant Killer Concentrate	2	chlorpyrifos (1.0)
	Antrol Ant Traps	1	propoxur (2.0)
Cessco	Accudose Aerosol®	5	chlorpyrifos (1.0)
	Accudose Aerosol®	5	pyrethrins (0.7)
Ciba-Geigy	Spectracide® Lawn & Garden Insect Control Spray	2	diazinon (25.0)
	Spectracide® Granular Lawn Insect Control	3	diazinon (2.0)
	Spectracide® 6000 Lawn and Garden Insect Control	3	diazinon (5.0)
	Spectracide® Fire Ant Killer	3	diazinon (5.0)
Cotton's Products, Inc.	Cotton's Fire Ant Killer	5	petroleum distillates (99.86)
Dexol	Fire Ant Killer	2	chlorpyrifos (6.7)
	Dexa-Klor Ant Killer Dust	4	bendiocarb (1.0)
	Dexa-Klor Soil Insect Spray	2	chlorpyrifos (6.7)
	Dexa-Klor Insect Spray	2	chlorpyrifos (6.7)

Table 1, continued

Company name	Product name	Use*	Active ingredients (%)
Dow Chemicals U.S.A.	Dursban® 50W	6	chlorpyrifos (50.00)
	Dursban® 2E	2.8	chlorpyrifos (22.4)
	Dursban® 4E	2.8	chlorpyrifos (44.4)
C and J Chemical	Enforcer Fire Ant Killer	5	tetramethrin (0.2) and fenvalerate (0.4)
ESCO	End-A-Bug® Fire Ant Killer	2	chlorpyrifos (8.7)
	End-A-Bug® Lawn Granules	3	chlorpyrifos (1.0)
Ferti-Lome	Fire Ant Killer Mound Drench	2	chlorpyrifos (8.7)
	Dursban® Fire Ant 10% Granular Insecticide	3.6	chlorpyrifos (10.0)
Ford's	Fire Ant Concentrate	2	chlorpyrifos (3.4)
	Dursban® 1E	2	chlorpyrifos (12.6)
	Fire Ant 2.5G Insecticide	3	chlorpyrifos (2.5)
	Dursban® Fire Ant 10% Granular Insecticide	3	chlorpyrifos (10.0)
Great Lakes Chemical Corp.	Brom-O-Gas®	7	methyl bromide (98.00)
Green Light	Diazinon® 5 Granules	3.8	diazinon (5.0)
	Diazinon® 14G	3.8	diazinon (14.0)
	Diazinon® Insect Spray®	2	diazinon (12.5)
	Diazinon® 12½E	2	diazinon (12.5)
	Double Dursban® Granules	3	chlorpyrifos (10.0)
	Ant Granules	3	diazinon (14.0)
	Fire Ant Killer Granules	3	chlorpyrifos (0.5)
	Fire Ant Killer	2	chlorpyrifos (6.27)
	Fire Ant Control	3	diazinon (5.0)
	Fire Ant Mound Drench	2	chlorpyrifos (0.10)
	Pro-Drone™ Fire Ant Bait	1	growth regulator (1.2)
Hi-Yield	Fire Ant Killer	2	chlorpyrifos (8.7)
	Imported Fire Ant Control Granules	3	diazinon (5.0)
ICI Americas, Inc.	Pro-Drone™ Insect Growth Regulator	1.8	growth regulator (1.2)
S.C. Johnson	Raid® Fire Ant Killer	2	chlorpyrifos (8.7)
Kenco	Rid-A-Bug® Fire Ant Killer	2	chlorpyrifos (0.5)
Kill-Ko	Diazinon® 2E	2	diazinon (25.0)
Mobay	Oftanol® 2 Insecticide	2.6	isofenphos (22.0)
Ortho	Diazinon® 2E	2	diazinon (25.0)
	Diazinon® Soil & Turf Insect Control	3	diazinon (5.0)
	Diazinon® Insect Spray	2	diazinon (25.0)
	Orthene® Systemic Insect Control	2	acephate (9.4)
	Fire Ant Control	2	chlorpyrifos (5.3)
	Fire Ant Killer Granules	3	diazinon (5.0)
	Lawn Insect Spray	2	chlorpyrifos (5.3)
	Orthene® 75S	2.4	acephate (75.0)
	Orthene® Fire Ant Killer	2.4	acephate (75.0)
	Ortho-Klor® Soil Insect and Termite Killer	2	chlorpyrifos (12.8)
	Ortho-Klor® Indoor and Outdoor Insect Killer	4	diazinon (1.0)
Maag Agrochemicals	Logic® Fire Ant Bait	1.8	fenoxycarb (1.00)

Table 1, continued

Company name	Product name	Use*	Active ingredients (%)
Merck & Co., Inc.	Affirm® Fire Ant Bait	1,8	avermectin (0.011)
P.B.I. Gordon	Logic® Fire Ant Bait	1,8	fenoxycarb (1.00)
Penick Pesticides	Pramex® Insecticide EC 13.3% Formula I Crawling Insect Spray	6	permethrin (13.30)
	Noxfire® Fire Ant Drench	2	rotenone (5.00)
Pennwalt	Knox Out® 2FM	2	diazinon (23.0)
Purina	Diazinon® Granules-5%	3	diazinon (5.0)
	Diazinon® Insecticide-25E	2	diazinon (25.0)
	Diazinon® Spray 12½%		diazinon (12.5)
Rampart Industries	MC-98®	7	methyl chloroform (98.0)
Rainbow Manufacturing Co.	Insect Control	3	chlorpyrifos (0.50)
Rigo	Affirm® Fire Ant Bait	1	avermectin (0.011)
	Diazinon® 2E	2	diazinon (25.0)
	Dursban® Lawn and Ornamental Insect Spray	2	chlorpyrifos (22.4)
	Diazinon® 5% Granules	3	diazinon (5.0)
	Fire Ant Granules	3	diazinon (5.0)
Rhone-Poulenc Ag. Co.	Sevin® Brand SL	2	carbaryl (43.0)
	Sevin® XLR Plus	2,8	carbaryl (43.4)
	Sevin® 80S	2	carbaryl (80.0)
	Sevin® 50W	2	carbaryl (50.0)
	Sevin® 4F	2,8	carbaryl (43.0)
Security	Diazinon® Spray (2-EC)	2	diazinon (25.0)
	Fire Ant Killer Mound Drench	2	diazinon (25.0)
Staffel's	Ant Granules	3,6	chlorpyrifos (1.0)
Starbar	Fire Ant Killer	2	chlorpyrifos (6.7)
State Chemical Manufacturing Co.	State® Fire Ant Killer	5	resmethrin (0.250)
	797-A Powdered Insecticide	4	pyrethrins (1.00) plus silica gel (40.00)
Vaporette	Fire Ant Killer Concentrate	2	chlorpyrifos (6.7)
Vigoro	5% Diazinon® Granules	3	diazinon (5.0)
Whitmire	PT 270 Dursban®	5	chlorpyrifos (0.5)
Zoecon	Strike®	2	chlorpyrifos (6.7)

*1 = bait
2 = mound drench
3 = granule
4 = dust
5 = injectable
6 = broadcast
7 = liquid fumigant
8 = root-dip for vegetable transplants and/or balled and burlapped nursery stock

Mr. VOLKMER. I have a question. Are we saying that all of our electrical equipment is going to have to be in a conduit? I mean, the wires are? They're going to have to be in a conduit? Most of them would be anyway, but that's going to have to be effectively sealed?

In other words, you're going to not even have to leave them a little bit open?

Dr. VINSON. That depends on where they're actually placed. In certain situations where fire ants are not nearby, I don't think one would have to do that.

For instance, if there were lines overhead, that wouldn't be necessarily a concern.

If you put them underground, yes, I think it would have to be sealed.

Mr. VOLKMER. We're going to have to have a lot of electrical energy going into this operation and I would anticipate probably that that will be brought in overhead. I don't know how they're planning to do that.

We won't have to worry about those high-powered lines. Is that correct?

Dr. VINSON. That's correct.

Mr. VOLKMER. Then, as far as what the worry would be after that electrical energy gets into the super collider——

Dr. VINSON. If it gets into the various equipment that I'm familiar within the collider, some of those might have to be sealed. In other situations, you might have to use some insecticides in the perimeter around the equipment. But that could be done.

Mr. VOLKMER. Is there any insecticide that's really viable against the fire ant?

Dr. VINSON. Fire ants aren't difficult to control—that is, individual fire ant situations. The problem is controlling fire ants over great areas that they infest in the United States at the present time in a long-term situation, which the people in these areas would like to see.

So, you know, in certain situations, they can be managed. The difficulty is it is a continual effort that you have to put into managing them.

Mr. VOLKMER. In other words, we do have insecticides which will kill fire ants?

Dr. VINSON. That's correct.

Mr. VOLKMER. It's just because of the methodology of doing it, plus the way they operate, that we're not able to eradicate them completely from the United States?

Dr. VINSON. That's correct.

Mr. VOLKMER. I know we've had a big push on in the past to get rid of the fire ants in Mississippi. We spent quite a bit of Federal funds down there in how to get rid of the fire ants. And we still haven't gotten rid of the fire ants.

Dr. VINSON. That's correct. Some of us are still working on it.

Mr. VOLKMER. Okay. Are you doing any fire ant control research at Texas A&M?

Dr. VINSON. Yes, we do fire ant control research both in looking for new control procedures as well as evaluating those new procedures that have been discovered by other people.

Mr. VOLKMER. And what about—this is going to be probably outside, maybe, of a few other things, but this will be one of the—probably—largest construction jobs done in this area for some time. And have you done fire ant control around similar types of facilities in Texas?

Dr. VINSON. Certainly, I haven't. But there certainly are lots of counties that have had very wide management efforts. Those things are difficult to deal with in the present climate sometimes. I mean, the political climate.

But I think the construction site of the magnitude we're talking about here, I think it could be dealt with if that becomes involved.

Mr. VOLKMER. You're going to be using materials and the materials are going to be outside. The ants can get all over those materials and the materials will be brought inside. Then you've got fire ants inside without going through any concrete.

Dr. VINSON. Absolutely.

Mr. VOLKMER. And that ought to be part of it, that type of thing. Is that correct?

Dr. VINSON. That's correct. What I'm saying is there are methods to control the situation, I think, in those areas where control is needed.

Mr. VOLKMER. And I assume, since you have them in effect for—sometimes there are people in Texas that are used to doing that?

Dr. VINSON. That's correct.

Mr. VOLKMER. What's the difference between a single—queen population and a multiple—queen population?

I've seen some things, testimony—in fact, it may be in your testimony—some mention of that. What's the difference?

Dr. VINSON. There's two types of population of fire ants. The first is what we call the single—queen, where you can get about maybe 40–50 mounds per acre of this type of fire ant.

We have another form of fire ant that was originally discovered in Texas, but now found in a number of other States, in which we may have 100 queens in a colony, so they are much more difficult to control. But it doesn't mean they can't be; it's just much more difficult.

The other issue is that they do get rather high populations, up to maybe 300–400 mounds per acre.

This increases the problem, essentially, with the fire ant. Again, just because it increases the problem doesn't make it insoluble.

Mr. VOLKMER. What's the fire ant population around Waxahachie?

Dr. VINSON. In Waxahachie, like in any area where you have fire ants, it's very variable. In some areas, you'll hardly have any fire ants at all. In some areas, you have these high populations. So you've got a spotty distribution with these sorts of situations all across the infested range.

So I can't speak for the whole county, and I don't really know how the county is infested. It is infested in 31 locations, some more, some less.

Mr. VOLKMER. I want to thank you very much, Dr. Vinson. I think you've allayed the fears of some of us who are from areas where we don't even know what a fire ant looks like.

Well, let me ask you one other question. I do notice that—again, in your testimony, I believe it was—that death could occur. It depends on the individual, I suppose, and their immunities, what they have, as to whether or not.

How many deaths have you had from fire ants?

Dr. VINSON. That's very difficult to answer. To be truthful about it, there have been a few documented deaths, but it's very difficult to document death due to fire ant. But there has been some documentation.

The fire ant has been . . . .

Mr. VOLKMER. We got mosquito bites back home in Missouri. Would you liken a fire ant bite more severe than a mosquito bite? Would I get a little welt that itches or stings a little bit?

Dr. VINSON. If we take the medical impact out of the situation, because there's no possibility of transmitting disease with the fire ant, the fire ant is a little more severe. Usually, the people are stung hundreds of times. These secondary infections do cause serious problems.

I think it's a little more serious problem than the mosquito from that standpoint. And there are those individuals that are sensitive to insect stings no matter if it's a fire ant or a wasp, and those people have difficulties.

Mr. VOLKMER. Those type people, I guess, if they are doing construction work or anything up there later on, when this thing gets going, is there any way you can test people or determine whether or not they are susceptible?

Dr. VINSON. Yes, there is a way to deal with that, both testing and some people can get treatment—although it's not an easy thing to do. Some of them may choose not to work in those situations out of choice. But there are some things that can be done.

Mr. VOLKMER. Is there an antivenin?

Dr. VINSON. There's an antivenin you can take, but there is a long process and it's not to be taken lightly.

Mr. VOLKMER. Does the gentleman from Texas have any questions?

Mr. HALL. No, except to welcome Dr. Vinson and to tell him that I can almost testify that they won't kill you because I had two gloves full of them Sunday.

And also, for your research, you might find out that Dallas and Tarrant Counties should quit worrying so much because I think they've run them all over to Rockwall County. [Laughter.]

I understand your testimony is to the effect that we have no lasting detrimental effect from the location of the super collider? That wouldn't change the decision?

Dr. VINSON. That would be my feeling.

Mr. VOLKMER. All right. I see the gentleman from Michigan. Do you have any questions? This is our final witness if you have any questions.

Mr. HALL. I might ask you the correct way to say f-i-r-e ant.

Dr. VINSON. "Far ant". [Laughter.]

Mr. VOLKMER. Thank you very much for coming a long distance, Dr. Vinson. We appreciate your testimony here today.

That will conclude our hearing today.

[Whereupon, at 2:20 p.m., the Committee adjourned.]

APPENDIX

OPENING STATEMENT BY
U.S. REP. JERRY COSTELLO
APRIL 5, 1989
SUPERCONDUCTING SUPERCOLLIDER SITE SELECTION

Mr. Chairman, as our nation continues to fight for its rightful place in the international trade and technology market, the federal government and Congress must play a leading role in determining what resources will be allocated to important scientific advances.

The Superconducting Supercollider could place the United States at the forefront of the superconducter industry. Today this committee will discuss one of the most important decisions made regarding this project: The location of the collider.

I know that the eight finalist states - Illinois, Texas, California, New York, Arizona, Michigan, North Carolina and Colorado - all have excellent records of technological achievement and met the very difficult standards in attracting this important national project.

The Congressional Delegation from Illinois, as well as representatives from our state government, fought very hard to bring the Supercollider to our state in an effort to combine resources with the Argonne National Laboratory and the Fermi Lab.

Given the high priority of this project, I am interested to learn and review the criteria assigned by the Secretary of Energy to the chosen state and how this project will contribute to and cooperate with other technology centers throughout the United States.

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